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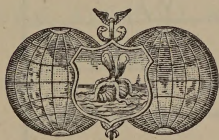
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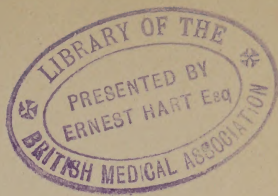
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# GENERAL THERAPEUTICS AND PHARMACEUTICAL CHEMISTRY.

By G. DUJARDIN-BEAUMETZ, M.D.,

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*Acetanilid (Antifebrin).*—A great deal has been said of the accidents arising from the employment of this drug, yet, nevertheless, it finds many champions, and it appears that, after all, good results may be derived from its use. D. Boswell, of Imperial, Neb., <sup>186</sup><sub>June, '94</sub> has frequently prescribed it, and has never observed any accidents. He regards it as without equal in lowering fever, its action being prompt and durable. Its only superior is the cold bath. In a later communication, <sup>186</sup><sub>Sept., '94</sub> he relates the case of a child, 10 years old, who had been given aconite and veratrum for ten days, at the end of which time the temperature was 105½° F. (40.8° C.), with active delirium and typhoid symptoms. A single dose of acetanilid in two hours reduced the temperature to 99° F. (37.2° C.), without collapse or strangury. A. R. Garey, of Ashland, <sup>186</sup><sub>July, '94</sub> has for some years made use of it as an analgesic and antipyretic, and can only speak in its favor. A. G. Krum, of Lebanon, <sup>186</sup><sub>Aug., '94</sub> does not understand the contempt of physicians for the drug, and believes that it must arise from its moderate price. Its good effects are especially observable in cephalalgia, rheumatism, etc. The best method of administration is in small doses, frequently repeated. R. J. MacNamara <sup>2</sup><sub>Mar. 31, '94</sub> states that even large doses may be given without causing the slightest symptoms. J. Preisach <sup>622</sup><sub>No. 36, '93</sub> has used the drug in the treatment of pharyngeal and laryngeal affections, as an anæsthetic, using the same solutions as for formanilid and antipyrin (*q. v.*), and concludes that when applied locally, while having analgesic properties, it is much less energetic than both the other drugs.

W. L. Wade, of Los Angeles, Cal., <sup>44</sup><sub>Aug., '94</sub> has found acetanilid



of great value in whooping-cough, giving  $\frac{1}{4}$  to  $\frac{1}{2}$  grain (0.016 to 0.03 gramme) every two hours to infants 1 to 2 months old, and proportionately larger doses to older children. Woods<sup>61</sup><sub>July 21, '94</sub>; <sup>80</sup><sub>Sept. 16, '94</sub> has used acetanilid in twenty cases of operative wound and laceration. He finds it an admirable and curative application to internal hæmorrhoids and a satisfactory dressing in the form of a suppository after their removal by the Paquelin cautery. He recommends it as an injection in gonorrhœa, using:  $\mathcal{R}$  Acetanilid, 1 drachm (4 grammes); alcohol,  $\frac{1}{2}$  fluidrachm (2 cubic centimetres); water, ad 8 fluidounces (250 cubic centimetres). Salol is administered at the same time.

D. R. Paterson, from a study of the reports of twenty-five physicians of New South Wales,<sup>15</sup><sub>No. 304, '93</sub> finds that the consensus of opinion is that symptoms of depression and collapse are more readily produced and are more marked than with the other drug; and this may be explained by the fall of temperature being greater and more rapid. Most of the reports mention cyanosis, and to a greater degree than after antipyrin. Anæmia may be induced by its continued use and become a grave condition. An investigation of its value by the Therapeutic Committee of the British Medical Association,<sup>2</sup><sub>Jan. 13, '94</sub> led to the following conclusions: Notwithstanding the experience of many apparently to the contrary, the conclusion must be permitted that to give antifebrin in doses of 5 and even 10 grains (0.32 to 0.65 gramme), still more to repeat these after a short interval, is a highly injudicious procedure. Such doses are altogether excessive. They are equivalent to about 25 and 50 grains (1.6 and 3.2 grammes) of antipyrin. The repute of the drug has probably suffered in the past from the circumstance that this fact of its greater strength has been overlooked. Indeed, the dosage employed has been so large as to lead one to surmise that in the minds of many observers antifebrin is regarded as a drug of the same strength as antipyrin.

*Acetic Acid.*—Kollmann<sup>113</sup><sub>No. 6, '94</sub> has used acetic acid as a succedaneum of hydrochloric acid in the treatment of gastric and acute or chronic intestinal catarrh, employing ordinary vinegar, a tablespoonful to half a pint (0.25 litre) of water daily. This treatment is especially indicated in those submitted to a diet rich in carbohydrates and unable to take much exercise, as, for instance, prisoners. Through this remedy he was able to control summer

diarrhœa and cholera nostras, which had formerly raged in the prison of which he was physician. It should not be forgotten, also, that vinegar rapidly and certainly kills the bacillus of cholera.

Warholm <sup>673</sup><sub>Dec., '93</sub> recommends vinegar as a remedy against vomiting in chloroform narcosis. A handkerchief moistened with vinegar is applied to the nostrils of the patient immediately after the operation and allowed to remain until he returns to consciousness, or longer if it agree with him. Of thirty cases in which this method was adopted by the author the majority experienced great benefit.

*Aconite*.—Wedekind, <sup>59</sup><sub>Sept., 30, '93</sub> in a case of tetanus, obtained good results from the administration of tincture of aconite, in doses of 5 drops every two hours at first and every four hours later on. The best formula is as follows: Chloral hydrate, 2.25 grammes (35 grains); potassium bromide, 4.05 grammes (1 drachm); tincture of opium, 30 drops; tincture of aconite, 5 drops. To be taken in a potion in a single dose. Basing his opinion upon a case in which recovery took place in ten days, the author gives the following advantages of the drug in tetanus: It lowers the temperature and, by its depressing action, aids in bringing on sleep. It diminishes the reflex excitability, and thus lessens the intensity of pain. All these properties compensate for the dangers which may arise through the use of large doses. It assists the favorable action of the chloral, bromide, and opium. It may be remarked that the author does not seem to attribute sufficient influence to the latter drugs, which are all powerful antitetanic remedies.

Blache <sup>22</sup><sub>July 22, '94</sub> has employed the tincture of aconite with benefit in the diseases of children, especially in catarrhal and spasmodic diseases of the respiratory apparatus. The following is his general formula: Tincture of aconite, 5 to 15 drops; tincture of belladonna, 4 to 10 drops; syrup of Tolu, 10 grammes (2½ fluidrachms); distilled water, 120 grammes (4 fluidounces). A small teaspoonful every hour.

The aconitine obtained from *Aconitum napellus* possesses, according to P. Aubert, <sup>575</sup><sub>No. 22, '94</sub> the same hydrotic properties as pilocarpine, though they are more slowly manifested and persist longer. This diaphoretic effect is not obtained by the doses



ordinarily employed. The aconitine obtained from *Aconitum ferox* and that from *A. japonicum* have no such property.

Tison, of Paris, read a paper on the therapeutic properties of nitrate of aconitine before the International Medical Congress.<sup>59</sup> May 5, '04 Dissolved in a mixture of glycerin, alcohol, and distilled water, in the proportion of  $\frac{1}{64}$  grain (0.001 gramme) to the drachm (4 cubic centimetres), he has used it in about 60 cases of facial erysipelas, and regards it as the best-known remedy for this affection, reducing the pain, preventing complications, and cutting short the attack. It is also of great value in certain forms of neuralgia, especially facial neuralgia. Neuralgias dependent upon chloranæmia are, however, better treated with exalgin. In many cases of laryngitis and aphonia due to an ordinary cold the nitrate of aconitia is also beneficial. The drug may be given in maximum doses of  $\frac{1}{64}$  grain (0.001 gramme) a day, divided in ten doses. In pyretic conditions he has never observed any intolerance of the drug, but in afebrile states there is occasionally a little formication caused by the doses above mentioned, and in such case it is necessary to suspend the administration of the remedy. The menstruum of alcohol, glycerin, and water, so proportioned that the mixture has the specific gravity of distilled water, is useful for the exhibition of all the alkaloids.

In spite of the good effects of aconite, however, many physicians object to its use on account of its being a dangerous medicament. Ferrand, of Paris,<sup>152</sup> Dec. 5, '93 believes it to be a powerful drug the use of which should be restricted to the laboratory. Grave accidents are often seen to follow the administration of small doses, and he himself observed a case of death following a minimum dose. There are, without doubt, many cases of individual intolerance for the drug, and syncope may occur in certain patients from small quantities. Even with tincture of aconite, he has seen 10 drops provoke symptoms of poisoning. Idiosyncrasy is much more frequently observed with aconite than with any other drug. This in itself should be enough to cause physicians, if not to reject it completely as a remedy, at least to advise its use only exceptionally.

Veil, of Paris,<sup>152</sup> Sept. 29, '93 reports a case in which 0.012 gramme ( $\frac{1}{8}$  grain) of crystallized aconitine was taken in mistake, the patient being saved through energetic measures, combined with

large doses of caffeine injected subcutaneously, to sustain the heart.

*Actæa Alba*.—W. H. Bentley, of Woodstock, Ky.,<sup>176</sup><sub>Sept., '94</sub> has for the past five years employed this drug (white cohosh) in all his cases of myalgia, using the fluid extract or an aceto-alcoholic tincture. When the myalgia is complicated with rheumatism or gout, the cohosh may be combined with remedies appropriate to the complication.

*Adonis Æstivalis*.—R. Kessler, of Cincinnati,<sup>814</sup><sub>Aug. 15, '94</sub> has used the tincture of this drug in his own case as a remedy for obesity. Before treatment was commenced he weighed 342 pounds (155 kilogrammes) and suffered from severe dyspnœa. After taking 10 drops of the tincture three times daily for twelve days, there was a loss in weight of 17 pounds (8 kilogrammes), respiration had become easier, and there was general euphoria.

*Alcohol*.—Naresh Chandra Mittra<sup>1055</sup><sub>Feb. 1, '94</sub> shows the difference between the effect of alcohol on healthy and sick individuals. While in the normal condition large amounts favor the development of gastric catarrh, it may be administered without danger in cases of prostration from disease. He notes a case of coma in which the happiest results were obtained through the use of large quantities of alcohol, without any disagreeable after-effects.

Victor Horsley, of London,<sup>723</sup><sub>July, '94</sub> has published an interesting study on alcohol in the surgery of the future, where it may be used in three ways: 1. As a narcotic or anæsthetic. Under this head it forms a part of the A. C. E. mixture, in which it plays the rôle of cardiac stimulant. At the present time, however, chloroform or ether alone are preferred. 2. As an aliment. It seems to be abandoned for this purpose, largely, the author believes, on account of the great progress made in antiseptic surgery. 3. As a stimulant. Surgeons of former days used alcohol very extensively to combat shock; but the old theories of shock have been proven erroneous, and alcohol has consequently become unnecessary. Horsley concludes that it will be less and less used in the future, and the discredit into which it has fallen is justified. Dakin, of Detroit,<sup>202</sup><sub>Mar. 26, '94</sub> and Jack, of Scurry, Tex.,<sup>74</sup><sub>May, '94</sub> add their note of warning against its indiscriminate use in medicine and regard it as of little value as compared to the damage it may do.

Sir B. W. Richardson<sup>38</sup><sub>No. 41, '94</sub> gives a description of his treatment



of cases in the London Temperance Hospital, where he uses practically no alcohol and does not allow the routine administration of ether or any drug as a substitute. He writes: "My plan has been to avoid temporary stimulation and to give steady support, trusting to the natural swing-round toward restoration, under careful feeding, continuous warmth, breathing of warm air, the horizontal position, and, as medicinal measures, such remedies as soothe and bring rest, like chloral, opium, the bromides, and digitalis. To my mind nothing could have been more satisfactory than the system thus described. To any one who has witnessed the recovery from apparently hopeless conditions under this mode of treatment, minus the use of alcohol, the results at first sight would be almost startling."

*Alimentation.*—Bardet, of Paris, <sup>527</sup><sub>June, '94</sub> made a communication upon the value of Graham bread, which contains all the constituent parts of the grain of wheat and 40 per cent. of nitrogenous matter, while the ordinary white bread contains but 25 per cent. The author believes that, when properly prepared, it is much more nutritive than fine white bread, and, being less fermented, is more easily assimilated. It is slightly laxative, owing to the considerable quantity of bran and fatty matters contained in it, and may therefore serve in therapeutics as an adjunct to a vegetable diet by increasing the amount of nitrogenous matter ingested, without recourse to meat. This richness of Graham bread in nitrogen may also be utilized in the following conditions: 1. In persons who do a great deal of bodily work, but eat little meat. 2. In constipated persons. Owing to its laxative quality, it is of great service in keeping the intestines free.

As bearing on the question of how much albumin is necessary to preserve health, Lapique stated, before the Société de Biologie of Paris, that he gave half the amount of food regarded as necessary to maintain a normal condition to two adults weighing 60 and 70 kilogrammes (132 and 154 pounds) for a period of several days. He found this ration to be quite sufficient, there being no apparent depreciation of nutrition. The occupations and muscular activity had not been modified.

Caird <sup>36</sup><sub>Sept., '93</sub> reports a case of extreme weakness and emaciation, due to malignant stricture of the œsophagus, which was improved by intra-muscular injections of sterilized olive-oil. In the course

of a week from 3 to 4 ounces of oil were injected into the gluteal region. There was no pain or inconvenience caused by the injection. Sugar was occasionally combined with the oil. None of the skin-punctures inflamed. There seems to be no limit to the amount of oil which a patient can tolerate.

W. R. Huggard, of Davos Platz, <sup>2</sup><sub>June 9, '94</sub> gives the following directions for the preparation of beef-powder at home: Lean beef is cut into small pieces; these are put into boiling fat, dripping, or butter for a couple of minutes until the surface is browned. They are then removed from the fat and placed on a strainer for a few moments. Afterward they are placed in a mincing-machine. The resulting mince is placed in a slow oven and dried. The drying process may take from five to twenty-four hours, or even longer, according to the heat employed. When thoroughly dried, the meat is quite crisp and can be ground in a coffee-mill that has not been used for any other purpose. In the drying process the meat loses a trifle more than four-fifths of its weight. This beef-powder can be taken in various ways,—with hot water or soup, with mashed potatoes, with bread and butter in a sandwich, or with a little pepsin in a starch-wafer. The writer has given this home-made beef-powder with such excellent effect in several cases where there was much difficulty with food that he thinks others may find it useful.

Bovet, of Pougues, <sup>67</sup><sub>May 30, '94</sub> advocates the use of *legumin* to render milk more digestible. This substance is a vegetable ferment which acts upon the casein, turning it into a soluble albuminoid,—a sort of lactated peptone. The legumin is also given independently as a food in doses of 50 grammes (1½ ounces) or more a day. He reports a number of cases in which patients were able to take this combination of milk and legumin when all other foods were rejected.

*Alkaloids.*—Guinard and Geley, of Lyons, <sup>14</sup><sub>p. 748, '94</sub> have studied the regulation of thermogenesis by the cutaneous action of certain alkaloids. Of eighteen such substances tried by the authors in solution or as ointments applied on the inner part of the thighs four were found to possess a constant regulating effect upon thermic reaction. These were cocaine, solanine, sparteine, and helleborine. In cases of true hyperpyrexia a lowering of from 0.5° to 3° C. (0.9° to 5.4° F.) was produced, the average fall being

from 1° to 1.5° C. (1.8° to 2.7° F.), the effect varying according to the patient, and especially according to the disease. They produced a more marked change at the beginning and end of acute affections than in the middle of the attack, and in mild rather than in grave forms. In healthy subjects, however, the effects were less apparent. It may be hoped to influence the temperature in this manner without administering the remedy internally. This is a new and extremely interesting point, to be compared with the effects of guaiacol (*q. v.*).

*Aloes.*—The *Aloe pictum* is much used, in popular medicine in Germany, in the treatment of pulmonary affections in general and phthisis in particular. From that country it has passed into Russia, where the fresh juice of the leaves is used, the dose being 5 to 8 drops in water, three or four times a day, before meals. The juice has a slightly-greenish color and a bitter-sweet taste; it is insoluble in water, with which it forms an emulsion, and leaves a slight, burning sensation on the tongue. Having observed several cases in which notable amelioration followed the use of aloë-juice (Ger. Pharm.), Rodionoff<sup>530</sup><sub>No.19,'93</sub> regards it as worthy the attention of therapeutists and pharmacologists. Improvement from its use is pronounced in the early stages of pulmonary tuberculosis; digestion is assisted; strength and body-weight increased; hæmoptysis, hectic fever, and night-sweats disappear; and the cough is diminished.

*Alpha-naphthol.*—Maximovicz<sup>113</sup><sub>No.10,'94</sub>; <sup>19</sup><sub>Apr.20,'94</sub> has studied the physiological and therapeutical action of alpha-naphthol, and finds that it is three times as powerful a bactericide and far less toxic than the beta-naphthol. In typhoid fever he usually administers it in doses of 0.5 to 1.0 gramme ( $7\frac{3}{4}$  to  $15\frac{1}{2}$  grains) three or four times a day; if this be insufficient he increases it to 6 or 8 grammes ( $11\frac{1}{2}$  or 2 drachms). Under the influence of the drug the morning remissions are less pronounced, the tongue clears up, and the meteorism and the pains in the right iliac fossa decrease and finally disappear. The duration of the disease is markedly shortened. It must be continued until the temperature has remained normal for three or four days.

*Alphol.*—Alphol is the salicylic ether of alpha-naphthol and an isomer of betol (the salicylic ether of beta-naphthol).<sup>747</sup><sub>V.22,p.85,'94</sub>; <sup>814</sup><sub>Apr.15</sub> Therapeutically, it is said to resemble salol. By the action of the



pancreatic and intestinal juices it is split up into salicylic acid and alpha-naphthol. It is reported to have given good results in gonorrhœal cystitis and acute articular rheumatism; and it has also been employed as an antiseptic and antineuralgic, like most of the compounds of naphthol. The ordinary dose ranges between 0.5 and 1.0 gramme ( $7\frac{3}{4}$  to  $15\frac{1}{2}$  grains), which may be increased to 2 grammes (31 grains).

*Aluminium.*—Boroformiate of aluminium is an hygroscopic salt occurring in pearly crystals, dissolving completely, though slowly, in water, the solution having an astringent, sweet taste, and, like alum, not coagulating solutions of albumin. According to Martenson,<sup>575</sup><sub>No. 41, '94</sub> ammoniacal boroformiate of aluminium is obtained by saturating a solution of boroformiate of aluminium with ammonium and evaporating the limpid liquid. This salt has not yet been successfully crystallized. Boroformiate of aluminium has been used for the past year in the Prince of Oldenberg's Children's Hospital at St. Petersburg, where it has supplanted all other preparations of aluminium. Borotartrate of aluminium, or boral, and borotannate of aluminium, or cutol, were discussed by Leuchter at the Vienna Congress of Physicians.<sup>575</sup><sub>No. 41, '94</sub> The former is a non-irritant antiseptic, freely soluble in water, and valuable in diseases of the nose and naso-pharynx; the latter is useful in erysipelas, and, in solution with tartaric acid, has given good results in blennorrhagia.

*Alumol.*—Heinze and Liebrecht<sup>317</sup><sub>No. 8, '94</sub>,<sup>5</sup><sub>July</sub> state that alumol is an aluminium salt of the naphthol-sulphur acids. It is a fine, white, non-hygroscopic powder, easily soluble in cold water. The authors believe it capable of deep as well as superficial astringent action. It has been tested in surgical, gynæcological, and dermatological cases. In gynæcological work, in the treatment of cavity wounds, after abdominal operations, etc., it is useful in solutions of 0.5 to 1 per cent. It is also useful, especially, in endometritis of gonorrhœal origin, as it attacks the gonococci deep in the tissues. Finally, it is useful in colpitis, if non-gonorrhœal in character, the strength being the same as given above. Gottheil used<sup>1</sup><sub>p. 532, '93</sub>,<sup>814</sup><sub>Feb. 1, '94</sub> it in powder, 12 to 25 per cent.; collodion, 5 to 10 per cent. strength, and ointment, 1, 5, and  $12\frac{1}{2}$  per cent., and found that the remedy acted most satisfactorily in acute eczemas of all sorts; in chronic eczemas, marked improvement was noted

in nine cases; in syphilis and the parasitic skin affections it was not of much benefit; in acute dermatitis it acted promptly, while in parenchymatous dermatitis it did fairly well; in acne and rosacea as good results were obtained by it as by most methods of treatment. The author believes the drug to be worthy of more extended trial. A. Stepanicz used the drug in simple chronic and hypertrophic rhinitis, ozæna, catarrhal and follicular tonsillitis, acute and chronic catarrhal and follicular pharyngitis. In all these diseases he employed the drug in a 1-per-cent. solution as a douche, in a watery, glycerin solution (1 to 5) for application to the affected parts, or in a powder mixed with starch (10 to 20 per cent.) for insufflation. In acute laryngeal affections the roughness of voice generally disappeared after a single inhalation of a 1-per-cent. solution. In chronic cases good results were obtained by the use of insufflations of a mixture of alumnol and starch (2 to 10 per cent.). A 1-per-cent. solution was of signal service as an hæmostatic in cases of hæmoptysis. Schwimmer, of Budapest, <sup>673</sup><sub>May, '94</sub> has found that alumnol is an astringent and antiseptic which does not combine with albumin,—as, for instance, with nitrate of silver,—thus enabling its effects to be exerted upon the deepest portions of the connective tissue. He has made numerous experiments, in cases of acute blennorrhagia in the male, with aqueous solutions of from  $\frac{1}{2}$  to 5 per cent., either as injections, urethral irrigations, or instillations with Guyon's or Ultzmann's sound. The results were good. In acute cases alumnol soon produced a certain irritation; in chronic cases it was better supported, but the duration of the treatment was no shorter than with other remedies. In blennorrhagia in the female the results were excellent in both acute and chronic cases, patients at his clinic being cured in from two weeks to two months. The remedy was applied as a vaginal injection with the aid of the speculum, or by tampons introduced into the cervical canal.

*Ammonia*.—A. J. C. Saunier, of Chicago, <sup>814</sup><sub>June 1, '94</sub> recommends the hypodermatic injection of aromatic spirits of ammonia in asphyxia and allied conditions. In a case of uræmic convulsions following scarlet fever, in which respiration and pulsation had apparently ceased, the injection of 1 drachm (4 grammes) above the cardiac region caused the patient to return to consciousness, but in about fifteen minutes he relapsed again into unconscious-

ness and the pulse and respiration ceased. Another injection caused a partial resuscitation, from which he lapsed sooner than from the first one. A repetition of the injections caused the return of pulsation and respiration four consecutive times, each time to a lessening degree, when death finally occurred. This experience led him to the use of the agent in other cases, among them a case of asphyxia from the fumes of naphtha and one of gas-poisoning. The ammonia should always be diluted in order to prevent sloughing of the tissues in the vicinity of the injection.

*Ammonium*.—Corrie<sup>81</sup><sub>v.20, No. 6, '98</sub> recommends the employment of ammonium chloride in the treatment of cystitis, primary or secondary. A capsule containing 5 grains (0.32 gramme) of pulverized purified drug should be taken three or four times in twenty-four hours, preferably when the stomach is empty, and followed immediately by a half-gobletful or a gobletful of pure cold water. The drug has been very faithfully tried in quite a large number of varied conditions with most satisfactory results. In the majority of cases the urine was rapidly cleared of mucus, blood-corpuscles, pus-corpuscles, urates, phosphates, and the distressing symptoms speedily disappeared. In no case did the salt occasion gastric or other disturbance when taken in the manner directed.

S. P. Popoff, of Vernyi, Siberia,<sup>2092</sup><sub>No. 5, '94; Oct. 27</sub> recommends picrate of ammonium internally in intermittent fever. He tried the remedy (dose not stated) in 42 successive cases, mostly of quotidian fever; of the number, 37 were recent, and all ended in recovery, the paroxysms ceasing on an average in four days. Of the 5 inveterate cases 2 were also cured, but in 3 the remedy failed. In 5 other cases antipyrin and in 6 methylene-blue were tried, resulting in 4 and 5 failures, respectively.

It having been demonstrated in the Edison Laboratory that tetra-ethyl-ammonium is one of the best solvents of uric acid, Peterson<sup>1</sup><sub>No. 772, '93</sub> undertook to establish the dosage of the medicament, with a view to its employment in the treatment of cases of uric-acid calculi and of gouty and rheumatic conditions. The drug answered admirably in the three cases of acute articular rheumatism in which it was employed. Doses of from 10 to 20 minims (0.65 to 1.3 grammes) of a 10-per-cent. solution may safely be administered by the mouth, and of not more than 10 minims (0.65 gramme) of a 1-per-cent. solution hypodermatically. Tetra-ethyl-



ammonium may be obtained by decomposing its iodide by moist nitrate of silver or its sulphate by baryta. It occurs in deliquescent, hair-like needles, and absorbs carbon dioxide from the air. It is strongly alkaline and saponifies fats. It is as bitter as quinine. It has a caustic action upon the epidermis, and an unctuous, alkaline feel when rubbed between the fingers. Its formula is  $\text{NEt}_4\text{OH}$ . It is not decomposed by the galvanic current. It forms numerous salts (sulphate, nitrate, phosphate, carbonate, hydrochlorate, hydrobromate, iodide, bromide), as well as double salts with gold, platinum, and mercury.

*Amyl-valerianate*.—Blanc <sup>108</sup><sub>Dec., '93</sub>; <sup>2</sup><sub>Mar. 10, '94</sub> describes valerianate of amyl, which is the odoriferous principle of the apple,—that is, the essence extracted by distillation together with alcohol. Cider has long been believed by the laity to have some effect on calculous formations, and this seems to be borne out by the fact that valerianate of amyl really has some solvent action on cholesterin. It is a colorless liquid, of pleasant taste when taken in small quantities, and can be prepared in the laboratory by the action of valerianic acid on amylic alcohol; 1 gramme ( $15\frac{1}{2}$  grains) of cholesterin is dissolved by  $4\frac{1}{2}$  grammes (70 grains) of valerianate at  $37^\circ \text{C}$ . ( $99^\circ \text{F}$ .), and by 3 grammes (46 grains) at  $40^\circ \text{C}$ . ( $104^\circ \text{F}$ .). Physiologically the action resembles that of ether, but the special qualities lie in its being a stimulant and sedative to the liver in cases of hepatic colic. It not only immediately subdues the attack, but it prevents recurrences. If the stomach is irritable, it may be necessary first to employ sulphuric ether, following this with 2 or 3 capsules of 0.15 gramme ( $2\frac{1}{4}$  grains) each, given every half-hour until the crisis is past, and continued at longer intervals during the following days. In nephritic colic the drug acts as an antispasmodic and general stimulant only, but no effect is produced on the renal calculi. Muscular rheumatism is frequently relieved, and much benefit is also derived from its use during menstrual uterine contractions. As a sedative it is of value in hysterical manifestations. Its toxic properties being very slight, as many as 5 or 6 capsules can be taken daily, but it is necessary to guard against gastric disturbance.

*Amylene-hydrate*.—Harnack and Meyer <sup>114</sup><sub>B. 24, H. 3, 4, '94</sub>; <sup>2</sup><sub>Oct. 20</sub> have arrived at the following results after careful investigation of the physiological properties possessed by amylene-hydrate. Like alco-

hol, it first excites and then successively paralyzes all the nerve-centres. In graminivorous animals quiet sleep is produced, whereas in carnivora the symptoms of excitement and intoxication are more pronounced. The fatal doses were found to be 15 to 30 grains (1 to 2 grammes) per kilogramme ( $2\frac{1}{5}$  pounds) weight of animal. A very marked diminution of temperature is produced, intensifying the danger to life. Muscular spasms produced by poisons, such as santonin and picrotoxin, are delayed or alleviated. The excretion of urea is diminished; and, finally, it cannot be employed subcutaneously, owing to the severe pain produced.

*Analgen.*—Scholkow<sup>69</sup><sub>No. 46, '93</sub> used this drug in 37 cases of pain of various kinds, with the following results: 6 cases of cephalalgia,—3 successes, 3 failures; 12 cases of neuralgia,—6 successes, 6 failures; 10 cases of articular rheumatism,—4 successes, 6 failures; 5 cases of muscular rheumatism,—1 success, 4 failures; 1 case of urticaria,—success; 1 case of bronchial asthma,—temporary improvement. In 2 cases an hypnotic effect was observed. Untoward secondary effects occurred only in a few instances, and consisted of nausea, vomiting, diarrhœa, tinnitus, and tremor. Very small doses are given at first, and increased up to 3 grammes (46 grains),—the maximum for twenty-four hours. Analgen seems to act upon the sensitive centres, lowering their excitability. The separation products of the drug are frequently eliminated by the urine, which is of a red color, rendered more marked by the addition of acetic acid (1 to 10). George Foy, of Dublin,<sup>22</sup><sub>June 13, '94</sub> has used analgen in about two hundred cases, the majority of neuralgia, and has found that the full dose of 15 grains (1 gramme) was necessary to produce relief.

*Aniline Dyes.*—Having suffered for several years from intermittent fever, Tomachewitch<sup>571</sup><sub>No. 30, '93</sub> successfully prescribed for himself and seven soldiers methylene-blue in doses of 0.6 gramme ( $9\frac{1}{4}$  grains) three times daily for six consecutive days. He concludes that the drug prevents the growth of the plasmodiæ in the blood, paralyzing their movements, and that it is superior to quinine on account of its energy and rapid action. He attributes its occasional failure to impurity in the drug used. Dombrowski regards<sup>520</sup><sub>No. 14, '94</sub> it as a specific in intermittent fever, and Frainich<sup>116</sup><sub>Apr., '94</sub> speaks favorably of it in this disease. Kasem-Beck<sup>586</sup><sub>Nos. 23, 27, '93</sub> used it in thirty cases of intermittent fever uncontrolled by quinine, employing

powdered nutmeg to prevent unpleasant secondary effects. He succeeded not only in arresting the attacks, but even in preventing them. He also employed the drug locally in diphtheria with good effect, and attributes its curative action to the fact that it is absorbed by the blood, while it does not irritate the mucous membranes.

Pilliet, of Paris, <sup>10</sup><sub>Apr. 24, '94</sub> questions whether the good effects obtained from the use of the drug in malaria are not due to the arsenic contained in the arsenious methylene-blue, the most common form used; also, whether the unpleasant effects sometimes observed may not have the same origin. Baginsky <sup>158</sup><sub>B. 17, H. 3</sub> tried methylene-blue in four cases of intermittent fever in children. The patients soon showed a dislike for the remedy, which was vomited, and the author believes that it can in no way replace quinine in malaria, though it may be tried where children absolutely refuse to take quinine. Ketli <sup>1130</sup><sub>v. 11, No. 1</sub> is of the same opinion. Our corresponding editor, Levison, of Copenhagen, <sup>673</sup><sub>Oct., '94</sub> states that Gram <sup>373</sup><sub>p. 437, '94</sub> tried chloride of methylene-blue, in 0.10-gramme (1½ grains) doses three times a day, in four cases of leucocythæmia. During the administration of the drug the number of leucocytes diminished and the patients seemed to improve; but three of the cases ended fatally and the fourth was finally discharged from the hospital unimproved. In some instances the drug seemed also to cause a diminution in the number of red corpuscles.

G. Leventhal <sup>586</sup><sub>No. 22, '94</sub> used methylene-blue in twelve cases of acute nephritis, as proposed by Netchaëff, giving 0.3 gramme (4½ grains) three times daily, every other day. The results were such as to lead him to recommend the drug in such cases.

Thur <sup>13</sup><sub>B. 240, No. 40; Jan. 13, '94</sub> <sup>9</sup> has employed methylene-blue, in doses of 3 grains (0.20 gramme) given twice or thrice daily, in the treatment of eleven cases of beriberi, with excellent results. The general condition was rapidly ameliorated: while the respiration became quieter and deeper, the pulse diminished in frequency, became fuller, stronger, and more regular, and the appetite and sleep were improved. Continued administration of the drug was followed by increase in the secretion of urine and diminution of the anasarca, and a favorable influence was exerted upon the excretion of albumin.

Darier <sup>3</sup><sub>May 23, '94; p. 226</sub> <sup>673 relates a series of cases of cancerous tumors of</sup>



the face rapidly cured by daily applications of 1 to 20 methyl-blue. This medicament appears to have a specific action upon the disease, and if properly used may lead to cure without any other associated treatment; it is, however, much more efficacious and rapid in action if the affected area be first cauterized, either with chromic acid or with galvano-cautery. In deep tumors it should be injected hypodermatically; and where a large surface has been destroyed by the growth, Darier recommends the use of skin-grafts between the fifteenth and twenty-first days.

O. Maibaum<sup>551</sup><sub>No. 43, '93</sub><sup>19</sup><sub>May 5, '94</sub> has tried this drug in the treatment of internal neoplasms of a malignant nature, in Wassiliew's clinic in Dorpat, Russia. He administered it three times a day in doses of 0.06 gramme (1 grain), in pill form, or associated with belladonna as a suppository: Pyoktanin, 0.06 gramme (1 grain); extract of belladonna, 0.02 gramme ( $\frac{1}{3}$  grain); cocoa-butter, 2.0 grammes (31 grains). In a case of pronounced cancer of the stomach an astonishing result was obtained; the patient increased in weight, the vomiting and eructations ceased, and his appetite re-appeared. In another case, where there were adhesions with the liver and metastases, improvement followed, but the patient soon left the clinic. Also in cases of carcinoma of other organs it was found to be of great service.

G. F. Kostuerin<sup>586</sup><sub>No. 32, '94</sub><sup>2</sup><sub>Oct. 27</sub> relates two cases of noma in which, after all the usual measures (actual cautery, perchloride of iron, thymol, iodoform, etc.) had failed, he resorted to hourly painting the parts with a 25- or 30-per-cent. aqueous solution of methylene-blue. In a few hours fœtor disappeared and sloughs began to fall off, while later on cicatrization set in. One of the patients ultimately died from exhaustion, but the other recovered. So far as Dunn, of Richmond,<sup>81</sup><sub>Sept., '94</sub> has been able to observe, the best results from the drug in otology may be expected in old cases of suppuration of the middle ear or of the adjunct nasal air-chambers, where the discharge is chiefly mucoid in character. He has not been able to note beneficial results following its use in acute suppurative processes.

Felix Freiherr<sup>1084</sup><sub>Nov. 13, 15, '93</sub> obtained satisfactory, though temporary, results in the treatment of malignant growths with pyoktanin. He prefers the local application of the drug. French, of Cincinnati,<sup>426</sup><sub>May, '94</sub> has used with very gratifying results, for the treatment

of cancer of the throat, the following formula: R<sub>x</sub> Pyoktanin, 1 drachm (4 grammes); chloroform, q. s. ut solv.; benzoïnol, 4 ounces (125 grammes). M. Sig.: Spray at intervals of one or two hours.

Mosetig-Moorhof,<sup>673</sup><sub>July, '94</sub> in a patient suffering from villous cancer of the gall-bladder, introduced into the examination wound every two days a pencil of methyl-blue, and gave 0.60 gramme (9½ grains) in pills. This treatment, begun March 6th, was followed by complete cure, at the time of report, May 6th. Bronowski<sup>520</sup><sub>No. 13, '94</sub> employed the remedy as an antipyretic in eight cases of phthisis, with marked effect upon the temperature, and in five cases upon the sweating. The doses varied from 2 to 3 grammes (31 to 46 grains), strangury occurring when this amount was exceeded.

*Animal Extracts.*—The therapeutics of the past year are remarkable for the enormous extension of serum therapeutics—*i.e.*, the therapeutic use of bacterial products—and also for the increase of organic extracts. Numerous articles have appeared on the latter subject, and considerable work has been done in spite of the death of the author of this method, Brown-Séquard. For the sake of convenience, the entire subject is considered under this title.

Max Kahane<sup>169</sup><sub>H. II, p. 641, '93</sub> presents a very scholarly and timely paper upon this subject, which is summarized as follows<sup>5</sup><sub>Mar., '94</sub>: 1. The use of organic tissues and of their extracts, as well as of organic juices, for therapeutic purposes is based upon a rational physiological and experimental pathological foundation which warrants further research. 2. The use of definite glandular extracts for therapeutic purposes and the incorporation of the same in the diseased organism, in which the analogous glands—that is, their products—are wanting, is based upon the new researches concerning the significance of these glands for the organism, and proceeds from the correct theory that the missing products can be restored by the analogously acting products of another healthy organism. 3. The Brown-Séquard injection of testicular juice, as well as the so-called nerve-transfusion, is by no means based upon a rational foundation; and it is more than likely that the real therapeutic results—even if the suggestion, which is sure to be present, is taken into account—warrant only the most humble expectations, and that their

results may be just as slight in cases of organic disease of the central nervous system as with non-organic methods. This is despite the fact that there has been ascribed to them a capability transcending such physiological effectivity as is explainable. 4. The investigations of extracts of other tissues limit themselves almost exclusively to experiments upon animals, and we cannot, from the stand-point of their therapeutic value at this time, make any definite statement.

Hénocque, of Paris, <sup>927</sup><sub>Jan. 13, '04</sub> states that, contrary to the opinion of Daremberg, the testicular fluid has no thermogenic properties, and cannot be compared to the tuberculin of Koch. Of numerous cases observed with minute care, in not one was elevation of the temperature noted. Richet and d'Arsonval, of Paris, <sup>927</sup><sub>Jan. 13, '04</sub> support the assertion of Hénocque, stating that no rise of temperature will occur unless the fluid has undergone some alteration. Brown-Séquard, of Paris, <sup>410</sup><sub>Oct., '93</sub> cited several instances tending to show that the testicular fluid prepared at the College of France enjoyed certain antiseptic properties. He quoted the experiments of Laveran, who mixed the fluid with cultures of the ordinary microbes of suppuration (*streptococcus pyogenes*, *staphylococcus pyogenes aureus*, *bacillus pyocyaneus*) and found that at the end of twenty-four hours inoculations of animals with the fluid were entirely sterile, causing no untoward symptoms. Brown-Séquard also showed that the testicular fluid would retard for a month the putrefaction of a piece of meat placed in it. Sabrazès and Rivière, of Bordeaux, <sup>188</sup><sub>Nov. 26, Dec. 3, '93</sub> criticized these opinions of Brown-Séquard, showing that the testicular fluid prepared by the great savant had always an acid reaction, so that it was not surprising that it sterilized organisms which could live only in an alkaline medium. If, on the other hand, microbes which could adapt themselves to a slightly-acid medium were chosen, such as the *bacillus coli communis* and the *bacillus* of Eberth, the results were no longer the same. The authors believe that the glycerin used plays a certain rôle in the antiseptic properties of this fluid. D'Arsonval <sup>410</sup><sub>No. 1, '04; May</sub> <sup>5</sup> now prepares the liquid so that it is not only aseptic, but it possesses such antiseptic properties that, if it should be contaminated by pathogenic germs, these germs will be rapidly killed or rendered powerless. The testicles are macerated in glycerin for twenty-four hours, and then filtered into a second



apparatus through Chardin paper, which has been sterilized in carbon dioxide under a pressure of fifty atmospheres for three or four hours. It is not certain that the combined action of concentrated glycerin and carbon dioxide under a pressure of fifty atmospheres will result in perfect sterilization, therefore the use of extracts heavily charged with glycerin is persisted in. The new extracts are more active, as has been shown by experiment. The liquid should not be injected pure, but diluted with two or three times its volume of 1-per-cent. salt solution, or carbolized water, 1 per 1000. This solution should be made very slowly, so that an intimate mixture may be made.

The general subject of the use of organic extracts and juices in therapeutics was made the topic of discussion at the Gesellschaft für innere Medizin of Berlin. <sup>41</sup> <sup>1</sup> Mar. 15, '94; May 26, '94 Fürbringer maintained that the method acted mainly by suggestion. In his practice no good results had been obtained by the injection of testicular juice. Moreover, the cases in which benefit had been obtained were rare and did not prove the antidotal virtue of the medication. The speaker remarked that Poehl regarded spermin as a vital principle scattered through the entire organism; therefore the introduction of spermin into the system would be indicated when the elements of the economy contained it in smaller quantity than normal. It was in conditions in which oxidation was imperfectly performed that spermin found its indication. While thus severe on testicular juice, he admitted the superiority of the treatment of myxœdema with thyroid extract. Pancreatic juice employed as a remedy for diabetes had not yielded brilliant results. Vitalin, a compound of several extracts, was often employed in Russia, but the statistics of cases treated by its use were not encouraging. American practitioners and Onimus, of Monaco, had spoken highly of cardin, obtained by macerating the heart of a bullock for eight months; the results obtained seemed to be remarkable. Brown-Séquard and Dieulafoy had experimented with nephrin in diseases of the kidney, and had proclaimed its good effects. Except for thyroid extract and possibly Poehl's spermin, the organic extracts should not, in his opinion, yet be used outside of the laboratory. Goldscheider had no success in the use of various animal extracts and juices. He admitted, however, that Brown-Séquard's theory rested on a scientific principle, but thought that

thus far its practical application had necessarily been more or less haphazard. Not until physiology had tried and determined the essential elements of each extract could the organic liquids be considered as of much assistance in therapeutics.

Monnet<sup>245</sup><sub>Sept., '93; Dec. 9</sub> has tried injections of testicular juice in a young girl of nervous temperament, affected with symmetrical leucoderma of the trunk and lower extremities; 3 cubic centimetres (46 minims) were injected morning and evening for six weeks. The general condition improved and the discoloration became gradually less, and at the end of three months the disease had almost entirely disappeared. Monnet has tried the same method in other skin affections, including three cases of ichthyosis, fourteen of neurotic eczema, several of "trophoneurotic erythema," and several of bullous and vesicular eruptions in the subjects of hemiplegia and general paralysis. Monnet explains the effect of the remedy in cutaneous trophoneuroses by its action on the nervous system, which is the source of the trouble. He thinks that injections of cerebrin would be more effectual in these cases. Brocq, while carefully avoiding committing himself on the subject, "cannot deny that the ideas on which rest the attempts of Monnet, are both logical and perfectly rational." Bourneville and Paul Cornet<sup>73</sup><sub>Dec. 9, '93; Mar., '94</sub><sup>131</sup> have treated 30 cases of epilepsy by the subcutaneous injection of testicular fluid, and have arrived at the following conclusions: 1. Deducting 2 cases, there remain 28 persons who were submitted to the treatment for a sufficient length of time to form a fair test of its value in epilepsy. According to d'Arsonval, if after six weeks there is no result, it is useless to persevere longer. 2. Of the 28 cases, in 8 there was slight diminution of the fits. In the other 20 the number of fits was increased. Cases with mental failure were selected in order that a better idea might be gained of the action of the testicular fluid in promoting mental improvement. In none of them did the intellectual state show any amelioration. 3. These results, which conform to those of Féré, are contradictory to those published by Pierret in a thesis by one of his pupils. 4. In 6 cases there was a decided increase in the body-weight during treatment; in 3 others, a diminution; and in 1 it was unchanged. 5. The injections, which were carefully carried out, gave rise to no local troubles. Carter, of Liverpool,<sup>187</sup><sub>July, '94</sub> observed no improvement whatever in some cases of tabes

dorsalis in which the testicular fluid was tried. G. M. Wood and A. T. Whiting<sup>6</sup><sub>Feb. 3, '94</sub> also met with similar failure in a number of cases of ataxia, sclerosis, paralysis agitans, etc., and attribute whatever temporary amelioration occurred to mental suggestion rather than to the treatment itself.

At a meeting of the Société nationale de médecine de Lyon, Poehl, of St. Petersburg,<sup>211</sup><sub>May 6; July 1, '94</sub> said that spermin did not have its origin exclusively in the internal genital organs of the male. He had found it in the pancreatic tissue, in the thyroid gland, in the thymus, and in the ovaries, as it was a substance which entered into the composition of the normal blood of men and women. It possesses to a great degree the property of accelerating the process of oxidation. In another paper<sup>586</sup><sub>No. 3; Mar. 3, '94</sub> the same author draws attention to the beneficial effects of spermin in neurasthenia, anæmia, and certain cachexias. Weber<sup>586</sup><sub>No. 3, '94</sub> points out that recently he administered spermin in a case of poisoning by oysters, with satisfactory results. Poehl<sup>586</sup><sub>No. 32; Oct. 6, '94</sub> also strongly recommends a fair trial of spermin injections in Asiatic cholera, which method has recently been employed with the best results in three consecutive cases at the Semenovsky Alexandrovsky Voennyi Hospital in St. Petersburg. The beneficial effects are attributed to (1) a direct influence of spermin on the cholera vibrio and (2) spermin increasing intra-organic oxidation ("tissue respiration") and thus promoting the destruction and elimination of leucomaines absorbed from the intestines. The use of spermin is mainly indicated in initial stages of the disease. In advanced cases a favorable result can be expected only in the absence of a profound renal failure. Bubis<sup>21</sup><sub>Nos. 9, 12, '94</sub> states that spermin appears to be of value in all cases where a physiological tonic is indicated and when oxidation processes are to be assisted. O. J. Bogusz, of Moscow,<sup>586</sup><sub>Nos. 22, 25; Sept. 29, '94</sub> has devised a cheap and easy method of preparing spermin and its salts. Either testicles, ovaries, and pancreas from mammals, or hard and soft roes from fishes or codliver-oil (especially the white kinds, which, according to the author's researches, contain spermin in larger quantity than brown or yellow ones) may be used. The best and cheapest material is afforded by the roes obtained during spawning time, when the proportion of spermin attains its maximum.

C. Rossi<sup>591</sup><sub>v. 19, No. 4; July, '94</sub> reports experiments with transfusion of



nervous extract according to the methods of d'Arsonval and Constantin Paul, in ten patients in the asylum at Reggio. These patients were all of the curable class, and in no case was there recovery, and in only one any permanent improvement under the treatment. He is convinced that the greatest effects from its use are to be looked for in those cases where a psychical element comes in play, and that its action is mainly through mental suggestion,—an opinion vigorously sustained by Massalongo.

Teissier and Fraenkel,<sup>304</sup><sub>Apr. 21, '94</sub> from researches on the physiological action of a glycerin-extract of the kidney in albuminuria, find that injections of this substance augment the power of the kidney to eliminate toxic substances.

Moncorvo<sup>67</sup><sub>Nov. 15, '93</sub> <sup>242</sup><sub>June, '94</sub> tried the liquid extract of sheep's brains in children suffering from various constitutional diseases, with good effects. Robertson, of Glasgow,<sup>2</sup><sub>Dec. 16, '93</sub> after a trial of the same agent, hesitates to pronounce a definite opinion on its value until a greater number of clinical observations have been made. It is probable that in many cases suggestion will account for the improvement observed.

Julius Althaus<sup>6</sup><sub>Dec. 2, '93</sub> has experimented with cerebrin alpha and myelin alpha in the treatment of certain neuroses, and, contrary to the opinion of the preceding author and of Massalongo,<sup>589</sup><sub>Feb., '93</sub> asserts that suggestion plays no part in the results obtained. According to him the extracts have a twofold action. In the first instance they may be looked upon as a highly-specialized pabulum of nervous matter, in consequence of their containing protagon, cerebrin, and lecithin; and, in the second place, they appear to act as antitoxins, as the phosphorized bodies split up, under the influence of the alkalinity of the blood, into glycerophosphoric acid and cholin, which have the power of stimulating intracellular oxidation and the elimination of leucomaines.

Colleville, of Rheims,<sup>577</sup><sub>Nov., '93</sub> has substituted the yolk of egg for spermin or cerebrin, on the principle that it is within the reach of every one and is rich in lecithin,—an organic phosphorous substance favoring the assimilation of phosphorus. This substance is extracted from the yolk by means of sweet almonds or of vaselin.

Sahli, of Berne,<sup>2022</sup><sub>'94</sub> has made experiments with leech-extract in preventing the formation of thrombus. Haycraft and Dickinson had formerly shown that the extract of leech prevented the coag-

ulation of blood. The active principle is not destroyed in cooking, it is not poisonous, it is insoluble in alcohol and soluble in water, and is eliminated by the urine, which shows the characteristic properties of the extract. The more normal the condition of the kidneys, the shorter is the period of its efficacy. The harmless nature of intra-venous injections of leech-extract enabled the author to study their effects in cases of recurrent thrombosis and infarcts. As human blood becomes less readily coagulated than rabbit's blood, a man of 65 kilogrammes (143 pounds) would require the extract of eighty to ninety leeches. The medicament should be associated with other vascular agents, such as digitalis.

W. Pasteur<sup>197</sup><sub>p.35,'94</sub> reports three cases of myxœdema treated by thyroid preparations. Fresh thyroid gland was given the first time, the glycerin-extract the second time, and a dry preparation the third time. The results were excellent, but temporary, and the treatment had to be continued. In one case excessive doses caused marked acceleration of the pulse, loss of appetite, nausea, rapid emaciation continuing after the cessation of the treatment, weakness, pain in the back, and neuralgia. If moderate doses be given, however, the author believes that the symptoms characteristic of goitre can be made to disappear gradually. The puffiness diminishes little by little, the movements and the intelligence regain their former vivacity, the skin returns to its normal appearance, and the temperature rises.

Emminghaus and Reinhold, of Freiburg,<sup>296</sup><sub>No.18,'94</sub> submitted six insane patients with goitre to treatment by thyroidin, in the hope of obtaining an improvement in the mental disturbance. They used raw thyroid from the sheep, giving 6 or 7 grammes ( $1\frac{1}{2}$  or  $1\frac{3}{4}$  drachms) concealed in slices of sausage in a sandwich, repeating the dose in ten or fifteen days, and sometimes only after several weeks. The effect of the treatment was not sufficiently marked to warrant any definite conclusions. In five of the cases there was an appreciable diminution in the size of the goitre after each ingestion of thyroid. No untoward symptoms were observed, probably because the doses were given at long intervals.

J. Voisin, of Paris,<sup>420</sup><sub>No.10,'94</sub> reports a case of myxœdematous idiocy improved by thyroid grafting and thyroid feeding. The patient, a little girl, had been suffering for some months from pachydermatous cachexia. A subcutaneous thyroid graft was made from

beneath the breast of the child. After the wound had healed the skin began to change, becoming thinner and less rugous, and the patient manifested more vivacity. Bits of fresh thyroid gland were then given in preserved fruits, 6 to 8 grammes ( $1\frac{1}{2}$  to 2 drachms) twice a day being the dose employed. At the end of eighteen days the child became querulous, tearful, and a prey to imaginary fears, while insomnia developed, with some fever ( $38^{\circ}$  C. —  $100.4^{\circ}$  F.) and acceleration of the pulse. The treatment was discontinued and these symptoms ceased, when a marked improvement in the condition of the patient was noticeable.

P. Marie and L. Guerlain, of Paris, <sup>420</sup><sub>Feb. 9, '94</sub> report the case of a woman suffering from myxœdema for eight years, cured by the ingestion of sheep's thyroid. The great efficacy of the treatment is, in their minds, no longer in need of proof. It must be carried on with great caution, however, in order to prevent unpleasant and sometimes dangerous symptoms. They give the following directions for its preparation <sup>26</sup><sub>Apr. 2, '94</sub>: "Take a fresh thyroid lobe and cut it up into small fragments on a plate or saucer (should the gland contain an abundance of cysts it would perhaps be preferable to discard it), then pour some warm broth over these fragments on the same saucer or plate that served for the section, and make the patient swallow it immediately. Give one lobe daily during the first three or four days, and as soon as demyxœdemization is set going diminish the dose to a lobe every second day, and later on every third day. The quantity necessary for the patient's habitual use, in order to prevent recrudescence of the myxœdema, would seem to be a lobe every four or five days."

Costongo <sup>594</sup><sub>V. 20, No. 2</sub> reports a case of cachexia strumipriva cured by thyroid juice. He believes that internal administration is preferable to hypodermatic injection, or to the transplantation of thyroid grafts. He gave to his patient—who was suffering from sarcoma of the thyroid gland, for which total extirpation had been done—a daily dose of 3 grammes (46 grains) of fried thyroid and 3 or 4 grammes ( $\frac{3}{4}$  or 1 fluidrachm) of the extract prepared as indicated by Laache. At the end of six months the improvement was very marked. Massopust, of Trieste, <sup>336</sup><sub>No. 14, '94</sub> who was able to keep Costongo's patient under daily observation, confirms the efficacy of thyroid preparations given internally, no inconvenience having followed its use during some months.



George W. Cray, of New York, <sup>5</sup><sub>May, '94</sub> expresses the belief that many so-called idiots, imbeciles, cases of arrested development, etc., among children, are in fact cases of functional inactivity of the thyroid gland, and hence susceptible of treatment by thyroid extract, with improvement and perhaps even cure. He summarizes as follows the effects of thyroid treatment: Increased metabolism, shown by (1) elevation of temperature; (2) increased appetite, with more complete absorption of nitrogenous foods; (3) loss of weight, with nitrogen excreted in excess of that taken in the food; (4) growth of skeleton in the very young; (5) marked improvement in body-nutrition generally; (6) increased activity of mucous membranes, skin, and kidneys. The rheumatic symptoms and the anæmia are not only not relieved, but are frequently aggravated.

Our corresponding editor, Mygind, of Copenhagen, <sup>673</sup><sub>May, '94</sub> writes that F. Vermehren <sup>373</sup><sub>No. 5, '93</sub> reports the case of a woman, aged 29, who had exhibited symptoms of myxœdema from her fifth year, and who improved remarkably after having taken 4.25 grammes (1 drachm) in doses of 0.10 to 0.30 gramme ( $1\frac{3}{4}$  to  $4\frac{1}{2}$  grains) of extract of the thyroid gland of the calf, prepared by mincing the gland with glycerin in the proportion of one to two, and afterward precipitating the filtered juice by means of alcohol and drying the precipitate, a grayish-brown powder being formed. In a case successfully treated by L. Nielsen, of Copenhagen, <sup>373</sup><sub>No. 49, '93</sub> the thyroid gland was prepared in the following manner: The glands of the calf were, as far as possible, deprived of their fat and membranes, cut into fine pieces, and dried for about a fortnight in as thin a layer as possible, the temperature being about 40° to 50° Celsius. The glands were then crushed and treated with ether in order to remove the fat, the result in weight being 18.47 per cent. The mass was then formed into pills containing 0.10 gramme ( $1\frac{3}{4}$  grains each), and coated with cacao. The usual dose was 1 pill twice daily. Arnold Larsen <sup>373</sup><sub>No. 41, '93</sub> reports favorable results in a woman, aged 52, who consumed half a gland daily or every second day.

Auld, of Glasgow, <sup>2</sup><sub>July 7, '94</sub> observed great improvement, after the use of thyroid extract, in myxœdema, exophthalmic goitre, and psoriasis. He is of the opinion that it is advisable to continue the treatment for some time after the disappearance of the principal symptoms.

Samuel Ayres, of Pittsburgh, <sup>99</sup><sub>Sept. 27, '94</sub> recommends the careful trial of the method in selected cases, but discourages its indiscriminate employment. Starr, of New York, <sup>99</sup><sub>Sept. 27, '94</sub> observed unmistakable improvement in three cases of myxœdema, and of late has had good results with the use of the tabloids, containing each 5 grains of the extract. He has also found the treatment of benefit in neurosis of the menopause.

Byrom Bramwell, of Edinburgh, <sup>697</sup><sub>July</sub> <sup>99</sup><sub>Sept. 27, '94</sub> summarizes the results obtained from the treatment of 20 cases of psoriasis, as follows: 1. In a very considerable proportion of cases the thyroid treatment produces a temporary cure, the eruption entirely disappearing and the skin being left in an absolutely healthy condition. 2. In exceptional cases small doses produce a rapid improvement. 3. In others improvement is only produced after distinct symptoms of thyroidism. 4. Some obstinate cases ultimately yield to very large doses, continued for a long time. 5. No case should be regarded as hopeless unless thyroidism has been produced, the largest dose which the patient can take having been continued for at least two months. In several cases the first effect of the remedy is to produce an extension of the eruption, this being most marked in cases in which the treatment is most successful. 6. In some cases the treatment produces no effect. 7. Relapses are not prevented. 8. Long-standing, chronic cases are more readily cured than the more recent ones. He has not yet observed in healthy persons, nor in those suffering from skin diseases, the susceptibility to the drug sometimes shown by patients with myxœdema. In several of the cases of psoriasis there was a distinct gain in weight during the treatment, in other cases a loss. In some patients suppurative lesions of the skin developed as the result of an overdose, while in many a degree of tolerance was established after a time. In psoriasis, beginning with a small dose, he increases until distinct symptoms of thyroidism are produced, using the dry extract in the form of tabloids or palatinoids, and always giving the remedy by the mouth.

John Gordon <sup>2</sup><sub>Jan. 27, '94</sub> describes a case which he denominates as syphilitic psoriasis, and which is probably a papulo-squamous syphilide, occurring over the whole surface of the body, including the palms and soles. After five weeks' treatment by mercury and arsenic there was considerable improvement, but this line was

stopped and the patient placed on thyroid. In three weeks the disease had disappeared, leaving only the usual pigmentation, but, as the author takes occasion to remark, doubt remains as to whether the gland-extract exercises any controlling influence over the cutaneous manifestations of syphilis.

W. Dale James<sup>697</sup><sub>June, '94</sub> gives notes of the case of a man of 45, "an old psoriatic," who, after the ingestion of 4 tabloids of thyroid extract daily, manifested nervous symptoms, depression, palpitation, and flushings. After two weeks he complained of polydipsia; his urine was much increased in quantity, and acetone could be detected in his breath. The specific gravity of his urine was 1032, and sugar was found at every test. He was placed on diabetic diet and the thyroid administration stopped. In less than a month the sugar disappeared, and in six weeks the patient was entirely restored to health, except for his psoriasis, which was not in any way improved by the treatment.

Ménau<sup>18</sup><sub>June 10; July, '94</sub><sup>90</sup> records four cases of psoriasis treated by thyroid extract, in the form of pastilles. Two daily, equivalent to one thyroid gland, were given. One of the patients took thyroid gland daily. In none of the cases did any improvement result from the use of the medicament. The ingestion of a thyroid gland in one case produced a febrile condition, nausea, and diarrhoea without any manifestation of acute dermatitis.

Menzies<sup>3</sup><sub>V.14,p.170; Sept.15, '94</sub><sup>814</sup> treated a number of cases of malignant syphilis by means of thyroidin. The cases were cachectic, presenting squamous, ulcerous, osseous lesions, which had previously been treated in vain with mercurials and iodides. He administered thyroidin (dry extract of thyroid glands) in doses of 0.25 to 0.50 gramme (4 to  $7\frac{3}{4}$  grains) daily, in tablets, suspending specific medication, with the result of more or less considerable improvement of the local manifestations as well as in the general condition. The cutaneous and osseous lesions healed, at least in part; even the pigmented spots (consequent to syphilis) of the skin were seen to disappear. Davis<sup>814</sup><sub>Sept.15</sub> found thyroidin of valuable service in the treatment of obesity. After subjecting his patients to its use and to proper diet, the diminution of the body-weight was much greater (sometimes double or even treble) than that in individuals treated by diet alone.

Ewald<sup>3</sup><sub>p.367, '94</sub> calls attention to the appearance of glycosuria as



a result of the administration of tablets of thyroid gland, and also to the fact that the active principle of the thyroid does not lose its power under the influence of either the gastric juice or of heat, showing that it is not a ferment, properly so called.

Fraser <sup>2</sup><sub>No.1744,'94</sub> reports a case of pernicious anæmia in which he employed bone-marrow with considerable success. The patient was a man, aged 60 years, suffering from dyspnœa, swelling of the feet, frequent spells of vomiting, diarrhœa, great weakness, and slight pyrexia. Examination of the blood revealed: hæmocytes, 1,860,000 to 1,460,000 per cubic millimetre; hæmoglobin, 28 to 30 per cent. Three ounces (90 grammes) of uncooked bone-marrow from the ox were given by the mouth daily. After twenty-seven days the hæmocytes numbered 3,900,000 per cubic millimetre and the hæmoglobin amounted to 78 per cent. Danforth <sup>1080</sup><sub>V.4, No.1,'94</sub> reports a very severe case, in which good results attended the use of bone-marrow. The anterior extremities of calves' ribs were comminuted so as to expose the cancellated tissue, and the fragments were placed in a jar and covered with glycerin, to the influence of which they were exposed for three or four days, being occasionally agitated. At the end of this time the liquid was strained through flannel, and the resulting fluid presented a reddish, syrupy appearance, without pronounced odor, and with the taste of glycerin. At first a teaspoonful of this extract was administered thrice daily, together with 5 drops of Fowler's solution, but, as the sweetish taste of the preparation excited nausea, the following combination was substituted: Solution of potassium arsenite,  $2\frac{1}{2}$  drachms (10 grammes); acid sodium phosphate, 3 ounces (93 grammes); extract of bone-marrow, 8 ounces (248 grammes). A dessertspoonful of this mixture after each meal proved entirely satisfactory. The patient steadily gained in strength and spirits, and in a short time presented every indication of restoration to former health. The hæmoglobin rose from 35 to 80 per cent., and red blood-corpuscles increased proportionately.

Undoubtedly the event of the year, so far as therapeutic interest is concerned, is the wide-spread attention called forth by the introduction of antitoxic serum. <sup>6</sup><sub>Dec.29,'94</sub> The impetus was given by the paper of Roux at the Congress of Hygiene and Demography at Budapest, though Behring, Aronson, and others had

previously been working in the same direction. The results claimed for this antitoxic serum in the treatment of diphtheria at first appeared so surprising that, although many have been induced to investigate, many have perhaps held aloof from a dread of yielding too readily to the wave of enthusiasm. The medical journals have, however, been gradually accumulating careful observations, and the latest experiences detailed seem to show that antitoxin possesses a marked power of diminishing the mortality, although accounts of some ill effects have been published. Far more numerous experiences must yet be collected before it is possible to consider that this form of treatment can be generally adopted with safety, but enough has been done to show the need of careful observations upon cases in which the presence of the diphtheritic element has been proved.

O. Heubner<sup>69</sup><sub>No.36,'94</sub> believes that the serum now furnished for the treatment of diphtheria can be measured as to its strength and its proper dosage arrived at. It has also been demonstrated to be harmless both as to local as well as to general manifestations. The strength of the serum is such that one part of serum by subcutaneous injection will kill twenty-five hundred times its weight of guinea-pig. In the treatment of these cases a syringe which can be made aseptic—for instance, the Koch bulb-syringe—is employed. The glass cylinder and the needles are boiled in a 10-per-cent. soda solution. The site chosen for the injection is either between the clavicles, under the ribs, in the flanks, or on the inner side of the thigh. The skin is washed with soap, cleansed with ether, and the physician sterilizes his hands. Before the syringe is filled directly from the bottle, it and the cannula are again cleansed with ether and alcohol. After the injection the puncture is covered by a bit of rubber adhesive plaster. Oscar Vulpius<sup>69</sup><sub>No.6</sub>; <sup>59</sup><sub>Aug.11,'94</sub> applies the liquid with a long-handled camel's hair brush, which is readily managed, first to the tonsils and soft palate, and, after thorough cleansing, to the pharynx. With restless children one must be content with imperfect treatment, and even with one application; even the liquid may be expelled by vomiting before it can reach the membrane. The results, as noted, include a marked subsidence of the fever; the membrane may remain entirely unchanged during the treatment, nor does this treatment prevent the tendency of the process to invade the

trachea and bronchial tubes; consequently it has no influence in preventing croup. However, as it is important that the remedy shall be brought into close contact with the diseased surface, it should be again applied as soon as the membrane is coughed up. In his series of cases, nineteen in number, the percentage of deaths was 52.6; omitting one case of the rare accident, late secondary hæmorrhage after tracheotomy, the rate falls to 50 per cent. Whether with an improved antidiphtherin, or with possibly a combination with this of a diplococcus poison, better results may be obtained, the future only will determine. (See also article on "Diphtheria," vol. i, I.)

W. Huebner, <sup>69</sup><sub>Aug. 16, '94</sub> from laboratory experiments, concludes that the serum of Tizzoni is three or four times weaker than that of Behring, while the tetanic antitoxin, as furnished by Merck, is not of the expected efficiency. Hans Doerbler <sup>34</sup><sub>No. 15, '94</sub> tried Behring's serum in a case of tetanus of moderate severity, but, owing to the late period at which it was used, could form no definite conclusion as to its value. Von Hacker <sup>22</sup><sub>No. 2879, '94</sub> has successfully treated two cases. The first had received chloral and morphine without success, the antitoxin being given on the fourth day, cure resulting in eighteen days. The second case was seen six weeks after injury and the antitoxin continued for sixteen days. Tizzoni and Cattani, <sup>22</sup><sub>No. 2884, '94</sub> report a successful case, the treatment being commenced twenty-four days after the injury. They give full instructions for the administration of the antitetanic serum, which is prepared in a dry state, with absolutely aseptic precautions, and will keep a long time without change if preserved from damp. It is to be opened only at the moment of preparing the injection. As a solvent distilled water is to be used, boiled for several minutes and then cooled, in the proportion of 1 part by weight of desiccated serum to 10 parts of water. An hypodermatic syringe of from 1 to 2 drachms' (4 to 8 cubic centimetres) capacity is employed. The instruments must be sterilized by heat, but not by chemicals, and allowed to cool before using. The quantity to be used varies according to the gravity of the case and the time at which the treatment is commenced. If the case is not of exceptional gravity, one-half of the contents of the glass tube is necessary for the first injection. The remainder is divided into four doses, to be used during the following four days, the proper



interval to be determined according to the effect produced upon the course of the tetanic phenomena. If the case is one of great gravity it may be necessary to use the entire contents of the tube for the first injection.

Calmette <sup>6</sup><sub>Apr. 14, '94</sub> states that it is possible to render animals proof against the bites of snakes, either by repeated injections of the poison, beginning with mild doses and progressing gradually to virulent doses, or by injecting them with the venom intermixed with certain chemical substances, as chloride of gold, hypochlorite of sodium, and hypochlorite of calcium. Immunity is obtained by a method analogous to that which Roux and Vaillard have employed to produce a condition proof against inoculation of tetanus.

Schleich <sup>2023 96</sup><sub>'94 ; Oct.</sub> used, in the treatment of wounds and skin diseases, fresh bovine blood-serum, mixed with 25 per cent. of zinc oxide, spread upon glass plates, allowed to dry, and then reduced to powder. From this powder four preparations were made: 1. The serum-paste, which is soluble in water, non-irritating, free from acid, can be used as an organic covering for eczema, burns, ulcers, etc. It adheres and becomes dry in a few minutes, but can be easily washed off, and forms practically the most non-irritating vehicle, and imitates exactly the natural scab. The preparation can be sterilized at 70° C. (158° F.) When heated above 100° C. (212° F.) the results are: 2. The pulvis serosa, which can be used pure or mixed with iodoform. It dries quickly and forms a moist blood-scab, which Schede has previously attempted to produce. 3. Nuclein, the substance of the cell-nuclei. This is not only a strong chemical compound, but also has the power, in 2- to 3-per-cent. combination with serum-powder, of eliminating the necrotic and broken-down tissue from a wound by a sort of digestive process, without doing the slightest damage to the healthy tissue. It clears away very quickly shreds of fibrin, broken-down connective tissue, bits of fascia, etc., and creates a perfectly clean wound. 4. Mercurial serum. This is a dry, mercurial paste, used instead of greasy inunctions in the treatment of syphilis. Three to 5 grammes ( $\frac{3}{4}$  to  $1\frac{1}{4}$  drachms) of the paste are smoothly applied with a brush upon the skin, into which the inunctions have been made, and allowed to dry. Three days later the mercurial paste is removed in the bath.

Bloch <sup>100</sup><sub>Mar. 6, '94</sub> advocates the injection of pure blood in cardiac

adynamia when other measures have failed; and, in tuberculosis, to produce immunity, by using blood from a case of local tuberculosis. Blood from a relative possessing the same morbid heredity, but refractory to the disease, may be used, thus combating both the hereditary taint and the microbe of tuberculosis.

Peillon<sup>211</sup><sub>Nov. 12; Dec. 2, '93</sub> has used artificial serum prepared according to the following formula of Huchard<sup>3</sup><sub>No. 13, '93</sub>: R Sterilized water, 100 grammes ( $3\frac{1}{4}$  fluidounces); chloride of sodium, 5 grammes ( $1\frac{1}{4}$  drachms); phosphate of soda, 10 grammes ( $2\frac{1}{2}$  drachms); sulphate of soda, 2.50 grammes ( $38\frac{3}{4}$  grains); and phenic acid, 0.50 gramme ( $7\frac{3}{4}$  grains). Injections of this substance, varying in amount from 5 to 10 cubic centimetres ( $1\frac{1}{4}$  to  $2\frac{1}{2}$  fluidrachms), were made in a girl aged 11 and a man aged 30. The injections had no bad effect locally or generally. The skin was first washed over an area of 6 to 10 centimetres ( $1\frac{1}{2}$  to  $2\frac{1}{2}$  fluidrachms) with soap and afterward with sublimate solution. A platinum cannula, sterilized by flame, was used, the strictest antiseptic precautions being taken. The girl was neurasthenic in the full sense of the word; her growth had been rapid, she had lost appetite, and was so easily fatigued that it was with difficulty she could go up a flight of stairs, and work of any kind, manual or intellectual, was impossible. The total amount of artificial serum injected was 120 grammes (4 fluidounces), the injections being given at intervals of three days. After the fifth injection there was marked improvement, and after a month of treatment the patient was able to return to school. The man suffered from no discoverable organic disease, but for two years he had, every three months, had attacks of hæmatemesis lasting two or three days. He was anæmic, had no appetite, and was so easily fatigued that he could do no work. Injections of artificial serum were given, and after the tenth the patient had gained two pounds in weight and was improved in every way.

Lemoine<sup>14</sup><sub>p. 200; May 15, '94</sub><sup>814</sup> obtained excellent results, in a case of grave hæmorrhage, by the subcutaneous injection of artificial serum. The patient was a young woman who had, during her pregnancy, been seized with abundant hæmorrhage. The following solution was injected: Sodium phosphate and sodium chloride, each 8 grammes (2 drachms); water, 1 litre (2.1 pints). The injection was made into the cellular tissue of the buttock, 800 grammes

(25½ fluidounces) of the liquid being used. Three hours later the fluid had nearly disappeared; the patient had recovered consciousness, the pulse was improved, and diuresis returned. The patient recovered.

*Antifebrin.*—See Acetanilid.

*Antipyrin.*—Schaak<sup>237</sup><sub>July, '94</sub> states that when sodium nitrite is added to an acidified dilute solution of antipyrin a bluish-green color is produced, which is still perceptible in dilutions of 1 in 20,000. In more concentrated solutions a crystalline precipitate of the same color is formed. These results are due to the reaction between the liberated nitrous acid and the antipyrin, by which a compound is formed that has been shown to be nitroso-antipyrin.

Vignerot<sup>433</sup><sub>Aug. 11, '94</sub><sup>2</sup><sub>Sept. 1</sub> has found intra-vesical injection of antipyrin an excellent remedy for pain in the bladder in many cases of cystitis. It is important that the bladder should not be in a condition of overdistension. Before washing out the viscus an injection of 10 to 20 grammes (2½ to 5 fluidrachms) of a 1 in 25 solution of antipyrin is left in the bladder for about ten minutes, so as to allow time for the drug to be absorbed. When the bladder is distended the practitioner should, in order not to prolong the operation, content himself with injecting, after washing out the viscus, from 60 to 120 grammes (1¾ to 4 fluidounces) or more of a 1 in 100 or 1 in 200 solution of antipyrin, leaving it in the bladder. J. H. Brik<sup>357</sup><sub>No. 4, '93</sub> has found it a useful analgesic in the purely nervous form of nephralgia and in the painful diseases of the pelvis and ureters, as inflammations, foreign bodies, etc.; in the motor and sensory neuroses of the bladder, neck of the bladder, and prostate, but of slight value in inflammations, new growths, and tuberculosis of these parts. Its property of acting on unstriated muscular fibre makes it useful in diseases of the urinary organs. It can be administered by the mouth or hypodermatically, and in this way it is excreted by the kidneys, or by rectal injection, or locally by injection into the bladder. If administered at night it is likely to relieve pain and produce rest. If 10 to 20 drops of a 5- to 20-per-cent. solution are injected into the prostatic urethra, a quite severe burning is apt to follow, which soon passes away and is replaced by analgesia. This effect may last ten to twelve hours. Preisach<sup>622</sup><sub>No. 36, '93</sub> used antipyrin as an anæsthetic in five cases of pharyngeal and laryngeal affections, without a failure, a



30- to 50-per-cent. solution being employed for examinations and the anæsthesia lasting several hours. The unpleasant symptoms observed were insignificant.

The inquiry conducted by the Therapeutic Committee of the British Medical Association, <sup>2</sup><sub>Jan. 13, '04</sub> as to the pathological effects of antipyrin, showed that, even when ill effects were recorded, they occurred as isolated instances out of many hundreds of cases; that in the large majority of these instances the dosage was injudiciously high or too long continued—that, in short, there was a very direct relation between the dosage and the occurrence of ill effects. The conclusion is warranted that, so far as the reports go, the ill effects are not of the frequency or importance supposed. The large majority of observers agree that they are of no importance whatever, and that with reasonable and judicious care they limit in no way the general usefulness of the drug as a therapeutic agent. Lépine, of Lyons, <sup>3</sup><sub>Mar. 14, '04</sub> criticises these conclusions, believing that in giving the drug the personal idiosyncrasy of the patient should be considered, as well as the integrity of the urinary and cardiac functions. A dose which would be safe for a person with healthy heart and kidneys might cause dangerous symptoms in a case where these organs are diseased. Atropine has been recommended as an antidote to antipyrin, but he prefers to use sodium bicarbonate.

R. D. Paterson, from a study of the reports of twenty-five physicians of South Wales, <sup>15</sup><sub>No. 304, '03</sub> states that large doses depress the nervous system, while the continued use of even small doses often leads to the establishment of the antipyrin habit. Jarvis Hood, of Grafton, <sup>267</sup><sub>May 15, '04</sub> reports a case in which lichen ruber was much aggravated by 10 grains (0.65 gramme) of antipyrin given in the course of an attack of influenza.

E. E. Haynes, of Memphis <sup>74</sup><sub>June, '04</sub> disapproves of the use of antipyrin and the other coal-tar antipyretics in cases of fever, believing that they do more harm than good. A case is reported by Krysinski, of Warsaw, <sup>520</sup><sub>No. 32, '03</sub> in which a girl of 20 years took 5.4 grammes (81 grains) of antipyrin for the relief of the headache. She did not lose consciousness, but the pulse became almost imperceptible, reaching 200 per minute. She recovered under absolute rest, strong coffee internally, and ice externally.

*Antirheumatin.*—This is the name given by Kamm to a com-

pound of sodium salicylate and methylene-blue. It occurs in prisms of dark-blue color, and soluble in water and in alcohol; its taste is flat, faintly bitter, and somewhat acrid after awhile, reminding one of salicylic acid. It is recommended by Fischer in rheumatism, <sup>742</sup><sub>V.7,p.597</sub> <sup>814</sup><sub>Feb.1,'94</sub> in doses of 0.06 to 0.10 gramme (1 to  $1\frac{3}{4}$  grains) every two to three hours in pills. During the use of this remedy the urine is blue when voided, turning green on standing; sometimes, however, it is green when passed, in consequence of oxidation within the body.

*Antispasmin*.—This is a slightly hygroscopic, white powder, of a slightly alkaline reaction. It contains 50 per cent. of narcaine. The dose is 0.2 to 0.5 gramme (3 to  $7\frac{3}{4}$  grains) for the adult. Rabow <sup>116</sup><sub>May,'94</sub> finds that it acts well as an hypnotic, though somewhat feeble, and only indicated in irritated conditions of the respiratory tract and in intestinal colic. It is more valuable in infantile therapeutics.

*Apocynum Cannabinum*.—A. G. Glinski <sup>586</sup><sub>Nos.6,7,'94</sub> finds that the action of the root of *Apocynum Cannabinum* is similar to that of digitalis without being cumulative. In cases of dilatation the fluid extract rapidly diminishes the area of dullness. It increases the daily amount of urine, stops the palpitation, and promotes the absorption of transudations. With the exception of increased pulsation of the arteries of the head, it has no bad secondary effects. It was used either in the form of a decoction of 1 drachm to 8 ounces (4 grammes to 0.25 litre), three to four tablespoonfuls a day, tincture (1 in 10) 5 to 10 minims (0.32 to 0.65 gramme) three or four times daily, or fluid extract in doses of 10 minims (0.65 gramme) to  $\frac{1}{2}$  teaspoonful three times daily.

Petteruti and Somma <sup>921</sup><sub>May to July,'94</sub> <sup>2</sup><sub>Sept.22,'94</sub> have used the root in two forms: an infusion with water and a tincture. The decoction had a strength of 1 to 3 in 150, that of the tincture 1 in 10. The results obtained in two cases led them to believe that the decoction was not the best form, owing to its emeto-cathartic action. The tincture was found to act as a diuretic without irritating the renal epithelium, and they conclude that it is likely to prove useful in cases of imperfect compensation of valvular lesions, either reducing or even completely curing the œdema and dyspnœa, which are the indications of such a condition. It does not irritate the primæ viæ, and may be used without danger for a long time.

*Argentamin*.—This is the name given to a liquid obtained by dissolving 1 part of phosphate or nitrate of silver in 10 parts of water holding in solution 1 part of ethylene-diamin. In combining with the latter the silver salt loses the very disagreeable properties of coagulating proteid substances and of forming a precipitate of silver chloride in the presence of sodium chloride; while its antiseptic and astringent actions are said to be considerably increased. Argentamin may be freely diluted with water without causing any precipitation. Schaeffer <sup>742</sup><sub>p.211,'94</sub> <sup>814</sup><sub>May 1,'94</sub> has successfully used it instead of silver nitrate in the treatment of gonorrhœa.

*Aristol*.—Krebs <sup>3</sup><sub>Aug.22,'94</sub> effected a complete cure in twenty-two out of thirty-three cases of chronic purulent otitis by means of insufflations of aristol. Haas, <sup>69</sup><sub>p.783,'94</sub> in treating burns, disinfects the surface with a boric-acid lotion and opens the blebs, applies aristol, and covers with sterilized cotton-wool, gutta-percha paper, and a bandage. The application of aristol-powder directly to the wound at the beginning hinders the dressing from soaking up the secretion; when the latter has diminished, however, the aristol may be applied either alone or in a 10-per-cent. ointment with olive-oil, vaselin, and lanolin. Nadaud's method of treating tuberculosis by aristol has been tried by da Silva, of Brazil, and Berardione, <sup>106</sup><sub>Oct., '94</sub> with good results. The latter, however, used larger doses, giving from 0.03 to 1.5 grammes ( $\frac{1}{2}$  to  $23\frac{1}{4}$  grains) daily in several injections.

*Arsenic*.—The use of this drug in pernicious anæmia, leukæmia, and pseudoleukæmia was the subject of a number of communications to the Eleventh International Medical Congress at Rome. <sup>2022</sup><sub>'94</sub> Warfvinge, of Stockholm, reported 21 cases of anæmia successfully treated by the remedy, 10 recovering without recurrence, 5 having one relapse, 4 two relapses, and 2 six relapses. Of these recurrent cases, 4 were well at the time of report and 7 died during the relapse, generally from some complication. In leukæmia and pseudoleukæmia the results with arsenic were not so satisfactory. The author believes arsenic to be as much of a specific in pernicious anæmia as mercury is in syphilis. Rummo, of Naples, stated that he had employed the iodide of arsenic subcutaneously, in doses of 0.005 to 0.025 gramme ( $\frac{1}{12}$  to  $\frac{2}{5}$  grain), in leukæmia and pseudoleukæmia. In one case the distended spleen occupied half the abdominal cavity. His results were



excellent. Cardarelli, of Naples, on the other hand, had obtained no result by the injection of large doses of arsenic in a serious case of leukæmia. He had sent his patient to the country, where he was much benefited. Popoff<sup>4</sup><sub>Jan. 8, '94</sub> obtained rapid and striking improvement, in two cases of malaria, by the use of the drug. He prefers to give it by subcutaneous injection, and enumerates as advantages the exact dosage and more rapid action, the possible use of the drug when the stomach or intestine would otherwise not tolerate it, and the possibility of treating at the same time this irritable state of the alimentary canal. Saalfeld<sup>116</sup><sub>Oct., '93</sub> avoids the abscess which so frequently follows the subcutaneous injection of a solution of 5-per-cent. sodium arsenate and Fowler's solution, by previously boiling the solution in an ordinary reagent-tube. Harold N. Moyer<sup>61</sup><sub>Oct. 7, '93</sub> believes the local irritation following the hypodermatic injection of Fowler's solution to be due to a small quantity of free arsenious acid in this preparation, and he avoids this irritation by using a pure, anhydrous solution of arsenate of sodium, which he found more beneficial than any other remedy in twenty-eight cases of chorea. Hochbalt<sup>116</sup><sub>Dec., '93</sub> regards arsenic as the only drug to be recommended in phthisis, given in the form of Fowler's solution, beginning with 1 drop and progressing to a maximum dose of 10 drops daily. Simon<sup>366</sup><sub>B. 17, H. 3, 4</sub> gives arsenic in nearly all the constitutional diseases of children over 2 years, as in scrofula, arthritis, and malaria, and in convalescence from infectious diseases. He uses almost entirely a solution of sodium arsenate, 0.05 to 250 of water, which is the strength of 0.001 gramme ( $\frac{1}{64}$  grain) to the teaspoonful;  $\frac{1}{2}$  teaspoonful is given at first after each meal, and is increased to 2 or 3 teaspoonfuls, the amount depending upon the age of the patient. It is well to discontinue its administration ten days in each month. Lassar<sup>41</sup><sub>No. 64, '94</sub> cured a case of malignant melanoma by the use of Fowler's solution in doses of 5 drops three times daily. Samter, of Königsberg,<sup>69</sup><sub>Sept. 23, '94</sub> also reports a case of spindle-celled sarcoma at the head of the tibia cured by the internal use of arsenic. This was given in the form of Asiatic pills (arsenious acid, 0.50; black pepper, 5; gum acacia, 1; water, q. s.), 10 of which were taken daily. Two years after treatment was begun cure was definite, the patient in that time having taken 2600 pills. Symson<sup>1171</sup><sub>v. 2, p. 73, '93</sub> gives liquor arsenicalis, 1 to 3 minims (0.065 to 0.2 cubic centi-

metre) two or three times daily, in the treatment of warts, cure taking place in a couple of weeks. Hutchinson<sup>806</sup><sub>v.5,p.364</sub> observed the case of a woman of 40 years, who had taken arsenic for more than a year, the skin becoming deeply pigmented, the heels cracked and sore, and the palms and soles very dry. There were also numerous large black freckles on the face. A second patient, who suffered from severe palmar and plantar psoriasis, was ordered 9 minims (0.58 cubic centimetre) of arsenical solution with  $\frac{1}{16}$  grain (0.004 gramme) of tartarized antimony thrice daily. In the course of a fortnight he had greatly improved, when suddenly the palms and soles became exceedingly tender, felt hot, and smarted,—symptoms which disappeared when the arsenic was discontinued. Mathieu<sup>73</sup><sub>v.1,p.244,'94</sub> had a patient, aged 50, who had for about twenty years taken 0.03 to 0.04 gramme ( $\frac{1}{2}$  to  $\frac{2}{8}$  grain) of arsenate of sodium daily. On increasing the dose he suffered from all the symptoms of arsenical poisoning: marked pigmentation of the skin; hyperkeratosis of the palms of the hands; irregularity, deformity, and channeling of the nails; atrophy of the muscles of the legs, with total loss of power in them; and some hyperæsthesia of the sole of the right foot. Mathieu was inclined to think that the symptoms were due to a peripheral neuritis. Our corresponding editor, Eklund, of Sweden,<sup>673</sup><sub>Mar., '94</sub> gives the details of a case reported by S. E. Henschen and Albin Hildebrand,<sup>372</sup><sub>v.29, No.3</sub> of a married woman, aged 49 years, who, for the purpose of curing epilepsy, took about half a teaspoonful of arsenious acid. The symptoms which followed agreed perfectly with the clinical picture of polyneuritis, and also presented the symptom-complex of arsenic poisoning. Death ensued. The case is notable in the following respects: 1. The rapid development of the typical symptom of arsenic poisoning. 2. The fatal issue. 3. At the post-mortem examination a small, tubular hæmorrhage in the gray substance of the left half of the spinal cord, at the level of the second lumbar nerve, was found. 4. This hæmorrhage might not have caused the paralysis. 5. There was no derangement of the functions of the bladder or rectum. 6. There were no symptoms of such hæmorrhage having been present. 7. There was no apparent alteration in the perception of pains. 8. On the other hand, the paralysis is satisfactorily accounted for by the general polyneuritis. 9. The paralysis was incomplete and almost tran-

sitory in the upper, but permanent in the lower, extremities. 10. The larger ganglion-cells and the cords of Goll were also manifestly involved in the degenerative process, and many cells were markedly atrophic. 11. Arsenic thus causes, in the human being, simultaneous alteration both of the spinal marrow and the peripheral nerves. 12. The rapid onset of objective symptoms show that the neuritis is not secondary, and the hæmorrhage proves that the spinal cord is actually influenced primarily by the arsenic.

*Arsenite of Copper.*—See Copper.

*Atropine.*—See Belladonna.

*Belladonna.*—A. Levison, <sup>4</sup><sub>Sept. 24, '94</sub> after a careful experimental study, concludes that atropine in large doses is of value in cases of morphine poisoning, in that it stimulates the respiration through the central organ in the brain. The stimulation of the heart is also of therapeutic value. The stimulating action of large doses of atropine can easily go on to a paralyzing effect, especially if they are carried directly into the blood-current. Delio <sup>226</sup><sub>B. 52, p. 97, '94</sub> believes that atropine will cause irregularities in the heart's action to disappear in mild cases, but that it has no effect either upon the frequency or rhythm of the cardiac pulsations in severe cases of arrhythmia. J. W. Byers <sup>814</sup><sub>Aug. 1, '94</sub> regards it as almost a specific in hæmorrhage of all kinds; in doses of  $\frac{1}{100}$  to  $\frac{1}{50}$  grain (0.00065 to 0.0013 gramme) hypodermatically every twenty minutes, it is invaluable in the treatment of epistaxis. In nephritic colic, Murray <sup>814</sup><sub>Jan. 15, '94</sub> gives belladonna-tincture in 30 to 40 drops every two to three hours, until a slight delirium appears, when its therapeutic action manifests itself by the cessation of the pain and the expulsion of the calculi. Against pains accompanying defecation in utero-ovarian and pelvic inflammations he uses with success suppositories thus formulated: Mercurial ointment, 0.12 gramme (2 grains); extract belladonna, 0.06 gramme (1 grain); bismuth subnitrate, 0.18 gramme (3 grains); cacao-butter, a sufficient quantity. For a suppository. Prepare six such suppositories. Introduce two a day.

In ileus he applies a compress of fifty square centimetres (about three inches square), coated with belladonna-extract mixed with a little vaselin. If, some hours after this application, symptoms of atropinism supervene, an enema of ox-gall is given, which often relieves intestinal obstruction. In typhlitis he administers



at first opium in large doses; the acute period of the affection having passed, he applies to the affected part a compress twenty by seven centimetres (eight by three inches), coated with the following ointment: Extract belladonna and potassium iodide, each 4 grammes (1 drachm); lard, 30 grammes (1 ounce).

The irritating action of potassium iodide on the skin promotes the absorption of the belladonna-extract contained in the ointment. He also advises his patients to introduce, every six or eight hours, a suppository containing 0.06 gramme (1 grain) of belladonna-extract. As soon as the first symptoms of intoxication appear, a soap enema with ox-gall and sodium carbonate should be administered, which produces a copious and easy stool without irritating the affected intestine.

H. Köbner <sup>3</sup><sub>No. 66, '93</sub>; <sup>814</sup><sub>Jan. 15, '94</sub> resorts to belladonna to combat salivary hypersecretion in certain affections of the mouth where cauterization is employed. His formulæ is: Extract belladonna, 3 parts; cherry-laurel water, 50 parts; distilled water, 100 parts. Mix; 10 to 20 drops two or three times a day. Half an hour before proceeding to cauterize the affected parts (by means of the galvanocautery, thermo-cautery, or silver-nitrate pencil) he administers 20 drops of the above mixture, and repeats the dose at the end of two or three hours. If necessary, 10 or 15 drops of the solution are also given the next morning.

-*Bismuth.*—Letulle <sup>1153</sup><sub>Jan. 7, '94</sub> recommends the use of subnitrate of bismuth in the intestinal hæmorrhage of typhoid fever, giving the drug freely by the mouth as soon as the first bloody stool is observed. From 80 to 100 grammes ( $2\frac{1}{2}$  to  $3\frac{1}{4}$  ounces) may be administered in twenty-four hours, in doses of 10 grammes ( $2\frac{1}{2}$  drachms), either in lactic-acid lemonade, diluted milk, or cachets; 40 grammes ( $1\frac{1}{4}$  ounces) may be given to a child of 12 years, in quince-syrup or boiled milk. N. L. Wilson <sup>1</sup><sub>Jan. 20, '94</sub> cites a case of poisoning by the drug. A young woman had a large burn on the back, which was powdered with subnitrate of bismuth. A dark line appeared on the lips, with headache, nausea, vomiting, fever, and quick pulse, and the urine contained a small quantity of albumin. Neither lead nor arsenic was found by analysis in the bismuth employed. A Dublin barrister, <sup>1</sup><sub>Mar. 3, '94</sub> however, writes to say that the symptoms in Wilson's case was no doubt due to arsenic, a small quantity of which is always present in subnitrate of

bismuth. Vittori<sup>953</sup><sub>No.73,'94</sub> advocates pyrogallate of bismuth as a substitute for pyrogallol in infectious diseases of the intestinal tract. Dermol, obtained by the action of chrysophanic acid on bismuth, has been satisfactorily employed as an ointment by Trojescu<sup>1049</sup><sub>No.19,'94</sub> in psoriasis, herpes, pityriasis, and other skin diseases.

*Bitters.*—A series of papers upon this subject have appeared from the pen of Hungarian physicians.<sup>1130</sup><sub>B.2,H.3,4; Sept.,'94</sub> Bókai gives the histological appearances of the stomach-cells in starving and well-fed dogs after the administration of calumbin and quassin, and argues from their condition that the secretion of both the cells of the fundus and the pylorus are rendered more active by them. Reusz tabulates the results of numerous artificial digestion experiments performed on raw and cooked meat, both with pepsin and trypsin, in the presence of bitter stuffs. Their presence hinders peptic digestion,—quassin, least; calumbin and condurangin, most; in tryptic digestion absinthin seems to aid the process, calumbin to hinder, the results from the others being indeterminate. Bernhard Vas says that they have no antiseptic action, while quassin and calumbin are slightly inhibitory to micro-organisms. Huber gives the results of an investigation into the action of bitter drugs on the peristalsis. Calumbin and absinthin increase the peristalsis; quassin has no effect on it. To ascertain the effect of these bodies on the intestinal putrefaction, Geyza Gara estimated the aromatic sulphuric acid in the urine after their administration. He finds that they have little inhibiting power, if any.

*Blood-Serum.*—See Animal Extracts.

*Bone-Marrow.*—See Animal Extracts.

*Boral.*—See Aluminium.

*Borax.*—The borax treatment of epilepsy has, of late, taken a great extension. It would appear, however, that the prolonged exhibition of a salt hitherto considered innocuous is not devoid of inconvenience to the patient, for Féré<sup>6</sup><sub>Dec.23,'93</sub> states that he has observed cutaneous troubles in such patients, consisting principally of seborrhœic eczema of the scalp. The hair is shed, but grows again when the administration of the borax is stopped.

The boric cachexia is often seen as a waxy tint of the complexion, with discoloration of the mucous membranes. Furuncular eruptions are often noticed. Besides these manifestations others of more serious import are observed. Œdema of the eye-

lids, of the face, and of the extremities is noticed, and albumin is found in the urine. Borism gives rise to accidents which are quite as grave as those of bromism, with the difference that those arising in the kidneys are more insidious and more difficult to remove. The inefficacy of the suppression of the drug for the relief of these conditions is explained by the slowness of its elimination.

*Borax-Tartar.*—See Potassium.

*Bread.*—See Alimentation.

*Bromal Hydrate.*—Sir Benjamin Ward Richardson <sup>692</sup><sub>July, '94</sub> speaks favorably of this drug, the analogue in the bromine series of the chloral hydrate in the chlorine series, as an antipyretic, though being difficult to procure in the pure state. He generally uses chloral hydrate for this purpose. When it is obtained pure, bromal hydrate is a crystalline substance not unlike chloral hydrate, and can be administered much in the same manner, but in a smaller dose. Three to 5 grains (0.2 to 0.32 gramme) of it dissolved in an ounce (31 cubic centimetres) of water form a sufficient dose for antifebrile purposes. It can be combined with all substances that are compatible with chloral hydrate. It can be given with chloroform-water, and  $\frac{1}{2}$  drachm (2 cubic centimetres) of glycerin added to each dose goes well. It can also be prescribed in combination with liquor ammonii acetatis.

*Bromide of Ethyl.*—See Ethyl-bromide.

*Bromides.*—Greenlees <sup>2095</sup><sub>'93</sub> <sup>2</sup><sub>Nov. 11, '93</sub> publishes some cases in which he attributes the fatal termination to bromide treatment. The first patient, a man suffering from idiopathic epilepsy, was in good general health when admitted into an asylum in 1868. From that date there was gradual deterioration in his physical condition, with increase in the number and severity of his fits. Early in February, 1887, potassium bromide, 25 grains (1.6 grammes), thrice daily, was commenced. About three weeks later stupor and great debility, with dry tongue, sordes on the teeth, and feeble, rapid pulse, set in. Inability to articulate distinctly, dysphagia, general muscular relaxation, and anæsthesia of mucous and cutaneous surfaces were noted on March 6th; these symptoms were soon followed by coma and death. The necropsy showed intense congestion of cerebral meninges; brain softer than normal, its cortex pink; focal softening in front part of each optic thalamus. Heart-cavities empty,



although the organ was in the condition of diastole; myocardium friable, and contained much blood. The second patient, an epileptic admitted in 1880, began taking 25 grains (1.6 grammes) of bromide thrice daily in February, 1887. In the course of two or three weeks he became stupid and lethargic. Stimulants and nux vomica were at once substituted for the bromide, but without averting the development of increasing stupor and general motor and sensory paralysis. In this case the meninges were congested; the kidneys were in an advanced stage of cirrhosis. Some other patients undergoing similar treatment developed less severe symptoms of the same nature as the above, from which they soon recovered. Analysis of the drug failed to detect any impurity.

*Bromoform.*—C. Van Wisselingh <sup>742</sup><sub>v.9,p.379</sub> proposes, in order to secure a uniform distribution of this drug in a mixture, to prescribe it in an emulsion consisting of 2 grammes (31 minims) of bromoform, 4 grammes (1 fluidrachm) each of olive-oil and acacia, and adding the other desired ingredients. Carpenter <sup>119</sup><sub>June 16, '94</sub> praises the good effects of bromoform in whooping-cough, regarding the drug as an anæsthetic of the pharyngeal mucous membrane, thus diminishing the frequency and intensity of the spasms. The dose used by him is 1 to 5 drops three times a day.

*Cactus Grandiflorus.*—A. V. Mikhaïloff <sup>209</sup><sub>No.29, '94</sub> <sup>2</sup><sub>Sept.29</sub> relates 2 cases of Graves's disease, 3 of cardiac organic affections, and 2 of chronic parenchymatous nephritis, in which he used fluid extract and tincture of cactus. The former was given in doses of 5 and the latter in doses of from 10 to 45 drops thrice daily. He found that (1) the administration rapidly induced a rise of arterial tension, which, however, was but very slight, and disappeared shortly after discontinuing the drug; (2) in cases of Graves's disease the secretion of urine increased, while in patients with renal disease it remained unaltered; (3) cardiac palpitation and dyspnœa quickly subsided, this effect being especially pronounced in exophthalmic goitre; (4) to secure a marked and permanent improvement a prolonged administration of the remedy in gradually-increasing doses seems to be necessary. Gordon Sharp <sup>15</sup><sub>p.161, '94</sub> does not believe that the drug can be included in the list of cardiac tonics. It is not even a simple stomachic tonic, and at best has only some slight diuretic action.

*Caffeine.*—Bruneau <sup>2031</sup><sub>Feb., '94</sub> has studied the effect of this drug

and its indications in the acute diseases of children, and finds that it is to be recommended as a remedy *par excellence*, children supporting it better than any other. He prefers subcutaneous injections to administration by the mouth, 0.40 gramme (6 grains) being given daily in two injections. He always precedes a bath in his young patients by an hypodermatic injection of caffeine, in order to prevent shock. According to Pawinski,<sup>114</sup><sub>B.23,H.5,6; Apr., '94</sub><sup>26</sup> caffeine acts chiefly as a stimulant to the nervous system. In this manner it affects the action of the heart, causing the beats to become stronger, and in some cases more rhythmical; but, unlike digitalis and strophanthus, it has no specific action on the inhibitory nerves of that organ. Its action on the vasomotor centres is marked, causing contraction of the vessels and increased tension in the same, the blood-pressure rising. To the latter is to be attributed the diuretic action of caffeine, and not merely its influence in the renal epithelium, as was formerly assumed to be the case. Caffeine is not cumulative in its action, but its too prolonged use may lead to hyperirritation of the vascular centres; even medium doses often produce symptoms of cerebral irritation in the case of alcoholics; indeed, attacks of acute mania may be so brought about. In exhibiting caffeine it is as well to begin with small doses, say 3 grains (0.2 gramme) three to five times a day, gradually rising to 5 grains (0.32 gramme) six to eight times a day; or a daily average of from 20 to 30 grains (1.3 to 2 grammes) of the sodio-benzoate, or 22 grains (1.43 grammes) of the sodio-salicylate. It may be advantageously administered either in powder form, aqueous solution, or as a suppository. As the result of his clinical investigations the author concludes: 1. That in the treatment of valvular disease of the heart digitalis and strophanthus take the first rank, and caffeine should only be resorted to when those drugs fail. Its effect on the rhythm is but slight. 2. In kidney affections and in valvular disease complicated with kidney trouble, digitalis and strophanthus should first be given a trial. 3. In diseases of the musculature of the heart—both those depending on degenerative processes in the muscular fibres and such as are termed functional—the action of caffeine is striking and beneficial; and in such affections the use of digitalis should be delayed to a later stage of the disease, when the heart is no longer capable of fulfilling its duties, when œdema and dyspnœa

have set in, and the transverse cardiac dullness—especially in the right lateral direction—continues to increase. Caffeine is further of great use in attacks of dyspnœa, such as are observed in cases of sclerosis of the coronary arteries; and also in cases of cardiac insufficiency following on overexertion, severe moral shock, or febrile maladies (typhoid, pneumonia, scarlatina, diphtheria).

Caffeine-chloral is recommended by Ewald<sup>69</sup><sub>No. 50, '93</sub> in aqueous solution for subcutaneous injection, in doses of from 3 to 6 grains (0.2 to 0.39 gramme), in the treatment of obstinate constipation. If necessary, the injection is repeated after an interval of two hours. Caffeine-chloral is a molecular combination of caffeine and chloral, and appears in colorless, shining scales readily and abundantly soluble in water. In the presence of alkalies caffeine and chloroform are set free.

*Calcium*.—E. Lehmann<sup>4</sup><sub>No. 23, '94</sub><sup>814</sup><sub>Sept.</sub> has undertaken a number of experiments to show the action of calcium salts in the human organism. He finds that after ingestion of calcium carbonate less  $P_2O_5$  and less  $Na_2O$  are eliminated with the urine, and thinks that calcium is of great importance to the organism. It is a fact that the calcium salts are of as great importance for nourishment as table-salt, sodium, and potassium. He concludes that calcium is a remedial agent which will render the blood more alkaline, the uric acid more easily soluble, and the quantity of urine more abundant. Saundby<sup>5</sup><sub>Apr., '94</sub> reports several cases of rectal hæmorrhage and purpura hæmorrhagica in which, when all other hæmostatics had failed, he succeeded in arresting the flow of blood by administering chloride of lime, in doses of 0.30 gramme ( $4\frac{1}{2}$  grains), several times daily. A. L. Berger<sup>2</sup><sub>Apr. 21, '94</sub> recommends, in the treatment of anal pruritus, the introduction of a bit of cotton soaked in a solution of chloride of lime. If a slight burning sensation or pain be felt, the cotton should be removed, the anal region washed with the solution and left to dry spontaneously. The itching ceases immediately, and other concomitant symptoms, such as swelling, eczematous eruptions on the perineum and scrotum, disappear after several applications.

*Calomel*.—See Mercury.

*Camphor*.—Phillips<sup>901</sup><sub>v. 21, p. 581</sub><sup>814</sup><sub>Feb. 1, '94</sub> advocates the more extensive use of camphor in the treatment of skin diseases. In pruritus ani he has found great relief to be obtained by the use of 1 drachm



of powdered camphor in 1 ounce of vaselin, the ointment being applied about and within the anus. In all vesicular, exudative, pruriginous affections, such as eczema, pemphigus, erysipelas, and intertrigo, pain, tension, and burning are relieved by a powder composed of camphor, 40 grains (2.60 grammes); oxide of zinc and powdered starch, each 1 ounce (31 grammes). Furuncles may be absorbed by applying to them spirits of camphor on absorbent cotton. Spirits of camphor will also kill pediculi.

B. B. Chatterji, of Balli, India, <sup>1055</sup><sub>Mar. 1, '94</sub> reports a case of poisonous symptoms from 40 minims (2.60 cubic centimetres) of Rubini's saturated camphor solution, taken for diarrhœa.

*Cannabis Indica*.—Glinski <sup>3</sup><sub>v. 2, p. 216</sub> studied on himself the action of this drug, for the relief of hypertrophy of the left ventricle with dilatation of the heart, manifested in paroxysms and accompanied by a systolic murmur at the apex (symptom of mitral regurgitation), præcordial distress and dyspnœa, increased by the slightest movement. Under the influence of the fluid extract, in doses of 10 to 15 drops, all the morbid phenomena, both subjective and objective, subsided in two days; the pulse, which beat at the rate of 110 per minute, fell to 80; and the dyspnœa was so completely suppressed that even a lengthy walk did not cause the slightest feeling of oppression. In cases of valvular lesions of the heart with symptoms of hyposystolia, in which strophanthus, adonis vernalis, and convallaria majalis had been administered without effect, Canadian hemp caused the disappearance of œdema and dyspnœa, as well as marked reduction of the area of cardiac dullness, within a few days.

Mackenzie <sup>3</sup><sub>No. 14, '94</sub>; <sup>112</sup><sub>Dec., '94</sub> speaks highly of cannabis Indica in all forms of cephalalgia, even in the severe headache attending cerebral growths. In chronic uræmia, where opium is contra-indicated, it is especially serviceable. It is almost a specific for that continuous form of headache which begins in the morning and lasts all day, the pain being generally dull and diffuse, but marked by occasional exacerbations. While it is rarely severe enough to interfere with occupation, yet it constitutes a source of constant annoyance to the patient. In such case the author administers, morning and evening, from  $\frac{1}{12}$  to  $\frac{1}{2}$  grain (0.005 to 0.03 gramme) of the extract in pills. If these doses are not sufficient he gives 1 grain (0.065 gramme) in the evening and

$\frac{1}{2}$  grain (0.03 gramme) in the morning. In very obstinate cases the dose is still further increased, the larger dose always being taken in the evening, until relief is afforded or toxic symptoms become manifest. In some instances Mackenzie combines gentian, cinchona, or hydrobromate of caffeine with the cannabis Indica. In various neuralgic affections, gastralgia, enteralgia, and the pains of tabes the drug often proves very useful. In skin diseases associated with intense itching, particularly senile pruritus, where local applications fail to relieve, cannabis Indica is often used with great benefit. The author has rarely observed any untoward effects from its use; nevertheless, to avoid toxic manifestations, the drug should be given at first in small doses, and gradually increased.

*Carbolic Acid.*—André Martin <sup>296</sup><sub>Jan. 6, '94</sub> used subcutaneous injections of carbolic acid in several cases of rheumatism and neuralgia with good results. He advises the following combination: R Pure carbolic acid, 15 to 30 grains (1 to 2 grammes); neutral glycerin or alcohol at 90°, 15 to 30 minims (1 to 2 cubic centimetres); distilled and boiled water, 3 fluidounces (93 cubic centimetres). One to three injections may be administered during the day, as required. These doses are not toxic; but, for the sake of precaution, especially in cases of kidney trouble, daily examination of the urine is sufficient to prevent the occurrence of untoward phenomena. Ritchie <sup>6</sup><sub>Nov. 25, '93</sub> had recourse to carbolic acid in a great many cases of diarrhoea of different kinds, giving keratinized pills containing 0.15 gramme ( $2\frac{1}{4}$  grains) every three hours. In most cases the diarrhoea disappeared after 5 or 6 pills had been given, and it was rarely necessary to prescribe more than 12 pills. Quill <sup>2</sup><sub>Apr. 28, '94</sub> successfully treated twelve cases of typhoid fever with chloroform combined with carbolic acid. C. A. Altmann, of Port Lincoln, South Australia, <sup>267</sup><sub>Aug. 15, '94</sub> cured a case of facial carbuncle by means of facial injections of carbolic acid into the parenchyma. This method has the advantage of leaving no scar and of being comparatively painless. Montborne <sup>186</sup><sub>June, '94</sub> adopted the same treatment successfully in the case of a man with eleven carbuncles on his neck and back.

O. H. Allis, of Philadelphia, <sup>119</sup><sub>Apr. 14, '94</sub> states that it would be safer to pour a gallon (4 litres) of pure carbolic acid into a purulent thoracic cavity than to pour in a gallon (4 litres) of water

into which a single ounce (31 cubic centimetres) of carbolic acid had been placed. Excess of the strong acid in a cavity such as an abscess-cavity, or upon exposed tissues, as a burn or fresh wound, does no harm; while excess of a dilute solution, if left in a cavity or used over an extensive raw surface, will be promptly followed by dangerous if not fatal toxic effects.

Friedeberg<sup>319</sup><sub>Mar. 3, '94</sub> records a case of carbolic-acid poisoning in a woman who made use of a solution of carbolic acid as a rectal injection instead of a vaginal irrigation. She rapidly became unconscious, with twitching of the hands; 500 grammes (1 pint) of lime-water with 100 grammes ( $3\frac{1}{4}$  fluidounces) of hot water were thrown up into the rectum. Camphor and also nat. sulphur. were injected subcutaneously. Three hours later she was better, and subsequently made a good recovery. The urine was deep yellow in color, becoming blackish green on standing. The large dose of 25 grammes ( $6\frac{1}{4}$  fluidrachms) was taken, and probably the favorable termination was due to the prompt treatment.

*Carbon Tetrachloride*.—See Methyl-chloride.

*Carduus Haemorrhoidalis*.—Goovaerts<sup>641</sup><sub>Nov., '93</sub>; <sup>1</sup><sub>July 22, '94</sub> used a preparation made from the excrescences of the *Carduus haemorrhoidalis* and regards it as an efficient remedy for epilepsy, hysteria, chorea, and nervous atony of the stomach, even in obstinate cases. The excrescences are caused by the puncture of the thistle-fly (*Urophora cardui*). Unfortunately, the district in which the plant is found is so small that the product obtained is very limited.

*Carpaine*.—Rumke<sup>583</sup><sub>No. 38, '93</sub> studied the action of this drug on the heart of frogs and warm-blooded animals. He found that in weak as well as in strong solution carpaine had a paralyzant action on the heart, the pulse losing its frequency, the quantity of blood thrown into the arteries at each systole being lessened, and the energy of the cardiac contractions diminishing. The effects were not altered when atropine was used to paralyze the terminal ramifications of the cardiac nerves; in other words, carpaine was found to be a myocardial poison, and, contrary to the assertions of Merck, not at all similar to digitalis in its action on the heart.

*Cerebrin*.—See Animal Extracts.

*Chloral*.—O. H. Allis<sup>43</sup><sub>July, '94</sub> recommends the use of chloral as an hypnotic, combined with opium. Excellent results may be



obtained by employing 5 grains (0.32 gramme) of chloral with laudanum or  $\frac{1}{8}$  to  $\frac{1}{4}$ -grain (0.008 to 0.016 gramme) of morphine, or, in children, with paregoric. He believes that its injurious effects on the heart have been exaggerated, and that if cardiac feebleness be suspected the administration of nitroglycerin will prevent any such symptoms.

J. Pal<sup>169</sup><sub>No. 8, '94</sub> believes that chloral possesses the advantages, over ligation of the limbs, of diminishing blood-pressure for a longer period, and the returning increase of blood-pressure is not so rapid as after loosening the bands. He has treated fifteen severe cases, all young individuals with sound hearts. The drug was administered by the rectum in from 15- to 40-grain (1 to 2.60 grammes) doses. The hæmorrhage ceased in the majority of cases in from one-half to three-quarters of an hour; in others it persisted for eight to twelve hours. In several instances the remedy seemed to be prophylactic. Vladimir de Holstein<sup>3</sup><sub>Sept. 20, '94</sub> calls attention to the fact that chloral hydrate, in addition to being an excellent soporific and sedative, possesses also the properties of relaxing spasmodically contracted muscular fibre, and of acting as a powerful dilator of the peripheral blood-vessels. When used as a laxative it should be prescribed only occasionally, in order to guard against tolerance. It must be avoided in cardiac affections.

J. E. Gardner<sup>19</sup><sub>Oct. 6, '94</sub> finds it excellent in assisting dilatation of the os uteri and relaxing the rigidity of the perineum in labor. B. W. Richardson<sup>38</sup><sub>v. 11, No. 41</sub> employs it regularly as an antipyretic, especially in enteric fever.

A case of death following the administration of this drug, observed by Wyatt Johnston, of Montreal,<sup>282</sup><sub>Oct., '93</sub> in an alcoholic who was given 25 grains (1.6 grammes) of chloral while still under the influence of liquor, was interesting on account of the coincidence of *Sarcina ventriculi* and dilatation, this condition, as far as the author knows, never having been noted in connection with sudden death. He regards it as unsafe to give a full dose of chloral to an intoxicated person until the alcohol has had time to be eliminated from his system.

*Chloralamid.*—C. Manchot<sup>20</sup><sub>B. 136, II. 2</sub> finds that the administration of chloralamid, even in moderate doses, causes the appearance of sugar in the urine for two or three days. In cases in which 9 grammes ( $2\frac{1}{4}$  drachms) were given the sugar persisted for seven

days. Experiments on rabbits confirmed this clinical observation, showing that chloralamid causes toxic effects in the organism.

*Chloralose*.—Gordon Morrill<sup>99</sup><sub>Nov. 16, '98</sub> believes this drug to be a most valuable hypnotic, and reports twenty cases of insomnia in which he used it with excellent effect. He gives a cachet containing 3 grains (0.2 gramme) one hour before sleeping-time, repeating it, if necessary. The largest dose he has given has been 12 grains (0.78 gramme). As a rule, it may be assumed that 3 grains (0.2 gramme)—repeated, if need be, when it is clear that the first dose has failed—will insure from five to nine hours of refreshing sleep. The author has had no experience with chloralose in locomotor ataxy, somnambulism, or pulmonary phthisis, all of which conditions are considered to be unfavorable to its action. Richet<sup>1000</sup><sub>Feb. 23, '94</sub> states that the minimum efficacious dose for the adult is from 0.2 to 1.5 grammes (3 to 23½ grains). In spite of its variability, he regards it, on the whole, as an excellent hypnotic, producing a more natural sleep than any other remedy. Charles Flemming<sup>11</sup><sub>July, '94</sub> regards it as beneficial in all forms of functional sleeplessness, in the insomnia of psychical excitement, hysteria, neurasthenia and overwork, functional cardiac irritability, and in attacks of epilepsy and somnambulism. It may enable us to separate subjective from objective pain, and so help in the differential diagnosis of some forms of hysteria. It is of no avail in the insomnia of alcoholic excitement, multiple neuritis, cerebral hæmorrhage, or the sleeplessness due to any painful organic lesion or peripheral irritation.

J. Ohmjelewski<sup>530</sup><sub>No. 24, '98</sub> tried chloralose in seventeen cases of mental disease, and found it, on the whole, very satisfactory, especially in cases in which chloral and sulphonal are contra-indicated. Chambard<sup>92</sup><sub>June, '94</sub> finds the strongest indications for its use in cardio-vascular affections, even in the asystolic stage. J. Sacaze<sup>2</sup><sub>Sept. 20, '94</sub> has tried the drug in several cases of phthisis, with relief not only of the insomnia, but also of the night-sweats. He suggests, in obstinate cases of insomnia in tuberculosis, the use of cachets containing 0.05 gramme ( $\frac{7}{8}$  grain) of chloralose and 0.15 to 0.20 gramme ( $2\frac{1}{4}$  to 3 grains) of sulphonal; and, if fever occur in the evening, a small quantity of sulphate of quinine may be added. G. Calton<sup>14</sup><sub>p. 541, '94</sub> states that sound sleep may be obtained by first giving 0.05 to 0.10 gramme ( $\frac{7}{8}$  to  $1\frac{3}{4}$  grains) of chloralose

and, half an hour or an hour later, injecting 0.25 to 0.50 cubic centimetre (4 to 7 $\frac{3}{4}$  minims) of a 1-per-cent. solution of morphine. The patient feels a sense of comfort and strength on awakening.

Léon L. Hoest<sup>293</sup><sub>July, '94</sub> finds it advantageous to give chloralose in a liquid vehicle, after having first dissolved it in a little tepid water. He sometimes disguises the bitterness of the drug by giving it in solid food. It is well to make the patient, at the same time, take some simple infusion to facilitate the assimilation of the drug.

Although chloralose has many partisans, the accidents arising from its use must also be taken into account, and from the numerous opinions expressed against the drug we select the most important. Massaro and Salemi<sup>1147</sup><sub>Feb. 15, '94</sub> state that its hypnotic power is uncertain and the sleep produced is light and short. The dose varies from 0.20 to 1.50 grammes (3 to 23 $\frac{1}{2}$  grains), but they have seen toxic symptoms following the use of 0.20 or 0.25 gramme (3 or 4 grains) in certain individuals. The phenomena of intoxication consist of motor disturbances (trembling, spasms, epileptic and cataleptic convulsions), psychic disturbances (vertigo, hallucinations, delirium, and amnesia), and respiratory disturbances (threatened asphyxia). They regard it as a dangerous hypnotic, and not to be recommended. Féré, of Paris,<sup>1090</sup><sub>No. 6, '94</sub> publishes an instance of nocturnal paralysis following the use of chloralose. A woman who had taken 0.20 gramme (3 grains) was seized with a feeling of anxiety, psychical disturbance, and paræsthesia. It appeared to her that she no longer had a body, this being quite insensible; she was incapable of producing the slightest movement in her limbs. It appears, therefore, that chloralose causes accidents similar to those occurring at night in neurasthenic patients.

Bardet<sup>14</sup><sub>Feb. 16, '94</sub> has seen poisonous symptoms produced in a child of 6 years, who had taken only 0.20 gramme (3 grains) of the drug. In two hours there were trembling, convulsions, and later a cataleptiform condition, which lasted two hours. On awakening from this, all symptoms disappeared. This trembling and intellectual stupor has been observed in adults, also, by Morel-Lavallée,<sup>14</sup><sub>Feb. 7, '94</sub> Talamon,<sup>31</sup><sub>Jan. 27, '94</sub> and Villeprand,<sup>14</sup><sub>Feb. 7, '94</sub> after a dose of 0.75 gramme (11 $\frac{1}{2}$  grains).

Touvenaint<sup>73</sup><sub>No. 10, '94</sub> observed toxic symptoms from the use of chloralose in two patients, the one suffering from diabetes, the



other from uterine fibroid. The dose administered was 0.40 gramme (6 grains) and was taken from a specimen which he had been using for the last year, showing that the purity of the drug was not involved. The symptoms were trembling, starting, nausea, vomiting, a species of dull restlessness accompanied by incoherence, and involuntary evacuation of urine and fæces. Watson Williams, of Bristol,<sup>15</sup><sub>Feb. 9, '04</sub> observed a case of delirium following the use of the drug. Lombroso<sup>589</sup><sub>No. 131, '98</sub> has seen complete loss of memory in an intelligent girl after the ingestion of 0.25 gramme (4 grains), and intense prurigo after a similar dose in another; while 0.50 gramme ( $7\frac{3}{4}$  grains) caused symptoms of paresis, with threatened asphyxia in a third patient.

Choupe, of Paris,<sup>14</sup><sub>Mar. 28, '04</sub> who is convinced of the usefulness of chloralose, without denying that these accidents may occur, regards them as comparatively unimportant, since the patients recover from them, and is of the opinion that the drug should not be abandoned, owing to its great hypnotic properties. The indications and contra-indications remain to be studied, for, as he justly says, it is not reasonable to suppose that a remedy can be applied indiscriminately in each case that presents itself in practice. No doubt there are certain morbid conditions in which it should not be used. In the treatment of the accidents arising from its use, no antidote has as yet been named, but the author recommends absolute quiet for the patient as an important matter, since the least noise causes an exacerbation of the nervous symptoms.

*Chloroform.*—Laborde, of Paris,<sup>10</sup><sub>July 3, '04</sub> in view of the difficulty of keeping chloroform chemically pure for the purpose of anæsthesia, advises a mixture of chloroform combined with one-tenth of its volume of anhydrous ether. Love<sup>267</sup><sub>June 16, '94</sub> calls attention to the necessity of keeping chloroform in a cool, dark place, since heat and light give rise to decomposition products. Latzko<sup>41</sup><sub>Feb. 8, '04</sub> had a patient who entirely recovered from osteomalacia after chloroform anæsthesia, and believes that some modification of the chloroform treatment may be of great value in this disease. P. A. Pröobrajensky<sup>1176</sup><sub>No. 7, '94</sub><sup>2</sup><sub>Feb. 9, '95</sub> relates four cases of acute tetanus treated by chloroform inhalations from one to three times a day, the daily dose of the drug varying from 2 to 4 drachms (8 to 16 grammes). In addition, hot baths and subcutaneous injections

of morphine were occasionally employed. Three of the patients recovered, one succumbed from supervening catarrhal pneumonia on the seventeenth day of the primary disease. In all the cases the inhalations induced muscular relaxation, while the breathing became deep and regular, and the pulse stronger and slower. The patients could be fed during the early stage of the narcosis, which also secured a quiet sleep of several hours' duration.

*Chlorphenol*.—Tschourilow,<sup>1101</sup><sub>Dec., '93</sub><sup>673</sup><sub>Feb., '94</sub> in making some experimental researches in the laboratory of Nencki, at the Imperial Institute of Experimental Medicine, at St. Petersburg, came to the conclusion that subcutaneous injections of ortho- and para-chlorphenol and orthobromphenol, in feeble solutions (1, 1½, and 2 per cent.), killed spores as resistant as anthrax more quickly than did a 5-per-cent. solution of carbolic acid. His results led him to use these drugs in the treatment of erysipelas, in the form of an ointment, 1 per cent., 2 per cent., and 3 per cent. of the preparation to 100 grammes (3¼ ounces) of vaselin. Friction of the affected parts was kept up for one minute twice a day. These frictions never produced irritation, even in patients with nephritis presenting general œdema of the skin. During the first few applications there was a slight lancinating pain in the parts, but this altogether disappeared. There was no general treatment, and no antipyretic was given, although in one case the temperature reached 40.8° C. (105.4° F.). The results were excellent. In 6 cases the erysipelas disappeared on the second day, in 8 on the third day, in 3 on the fourth day, in 2 on the sixth day, and in 4 on the seventh day. The longest treatment was for eight days,—in 2 patients with bullous erysipelas of the face and head, general weakness and delirium, and temperatures reaching 40.8° and 40.5° C. (105.4° and 104.8° F.). None of the 25 cases assumed the so-called phlegmonous character, as the author had observed in other methods of treatment. He believes that the remedies would be still more efficacious if administered by subcutaneous injection, as they would come in contact more quickly with the pathogenic microbe. That the injected substance would involve no danger either to the organism or to the skin in the vicinity of the injection he has proven by injecting into himself, on the sides of the abdomen, two Pravaz syringefuls of a 1-per-cent. aqueous solution of parachlorphenol.

N. Simanoffski <sup>586</sup><sub>No. 8, '94</sub> <sup>2</sup><sub>June 30</sub> has employed solutions of monochlorophenol in glycerin in the strength of 5 per cent., 10 per cent., and 20 per cent., in tuberculous and other diseases of the air-passages, and points out that these very powerful disinfectants do not irritate the mucous membrane, even if applied in a 20-per-cent. solution; that they form no stable combination with the tissue albumins, and that they are therefore able to penetrate into the depth of the diseased organ. The tuberculous cases treated were mostly very advanced and serious affections of the throat, with impairment of voice and difficulty in swallowing. In one case there was, besides these symptoms, a tuberculous ulcer at the root of the tongue; in another, a similar ulcer on the whole posterior wall of the pharynx and part of the naso-pharyngeal region. All cases improved quickly under the local treatment with monochlorophenol; the ulcers became clean and showed a tendency to heal, and all the accompanying symptoms disappeared. Equally good results were obtained in chronic thickening and hyperplasia of the mucous membranes, which disappeared after a few applications of the same solutions. Simanoffski is of opinion that the monochlorophenols will find a large field of application in diphtheria, etc., and he unhesitatingly recommends them in laryngological practice in preference to iodoform, pyoktanin, menthol, etc., especially as they also possess anæsthetic properties. Szmurlo, of Warsaw, <sup>520</sup><sub>No. 12, '94</sub> obtained entirely different results in similar cases, and concludes that, as far as non-tuberculous cases are concerned, parachlorophenol is much inferior to chromic acid, not to speak of galvanocauterization. In laryngeal tuberculosis the drug causes local œdema, as well as a prolonged and acute pain (even after previous cocainization), the patients losing appetite and becoming weak and nervous. Hence in such cases it is, in his opinion, if not altogether useless, greatly inferior to lactic or carbolic acid or menthol. Elsenburg <sup>45</sup><sub>B. 28, H. 1, '94</sub> reports a case of "almost complete cure" of lupus by parachlorophenol, applied locally.

*Cocaine.*—Wittsack, of Frankfort, <sup>113</sup><sub>No. 9, '94</sub> has substituted lactate of cocaine for lactic acid in the treatment of tubercular cystitis, with satisfactory results. He instilled a solution containing 1 gramme ( $15\frac{1}{2}$  grains) of lactate of cocaine, 5 grammes ( $1\frac{1}{4}$  fluidrachms) of lactic acid, and 5 grammes ( $1\frac{1}{4}$  fluidrachms) of distilled water, previously emptying the bladder, but not washing it



out. Geley, of Bordeaux, <sup>211</sup><sub>Jan. 14, '94</sub> finds that cocaine has an antipyretic action when applied to the skin, provided the applications be made at a time when the temperature is no longer rising. A solution of from 0.05 to 0.10 gramme ( $\frac{7}{8}$  to  $1\frac{3}{4}$  grains) in 1 gramme ( $15\frac{1}{2}$  minims) of water is applied to the upper part of the thigh. The action is analogous to that of guaiacol, though not so marked. V. Aduccio <sup>409</sup><sub>v. 20, p. 23</sub> finds that a much more intense action is produced in animals by administering repeated doses at short intervals, the poison having a successive action rather than a cumulative one. Lepkowski <sup>586</sup><sub>No. 14, '94</sub> calls attention to its antiseptic action, which, in two cases of alveolar periostitis, caused the disappearance of the inflammation.

E. Casoli <sup>505</sup><sub>Sept. 20, '94</sub> used a 5-per-cent. solution of hydrochlorate of cocaine in a solution of equal parts of water and glycerin, as a means of stopping the secretion of milk. On the seventh day of the treatment the secretion had entirely ceased. P. Joire <sup>296</sup><sub>May 24, '94</sub> used it for the same purpose and in the same manner, four or five times a day. His results were satisfactory in a number of cases.

Réclus <sup>164</sup><sub>Mar. 29, '94</sub> reports a fatal case of poisoning from the injection of 5 fluidrachms (20 cubic centimetres) of a 5-per-cent. solution of cocaine in the urethra. The patient died in a few moments. Réclus blamed the physician who made the injection, stating that solutions stronger than 2-per-cent. should not be used.

R. W. Haynes, of Los Angeles, <sup>9</sup><sub>July 7, '94</sub> protests against the abuse of cocaine in the treatment of disease. He reports five cases of poisoning by the drug, two of which were fatal. One of the latter was a child, who had received a urethral injection of cocaine in order to facilitate the passage of a sound. Death occurred in three days. The second fatal result followed the injection of 4 grains (0.25 gramme) of cocaine into the gums to facilitate the extraction of a tooth. The author believes that small doses of morphine are of value in counteracting the bad effects of the drug. Schilling <sup>575</sup><sub>p. 614, '93</sub> finds nitrite of amyl an effective antidote in cocaine poisoning; and E. J. Walker, of Manchester, <sup>2</sup><sub>Feb. 2, '95</sub> obtained immediate benefit from the use of this drug in a case in which about 8 grains (0.52 gramme) of cocaine had been taken in mistake for phenacetin. J. W. Stickler, of Orange, reports <sup>59</sup><sub>Jan. 13, '94</sub> a case of wakefulness from the use of cocaine, which

was not overcome by 20 grains (1.3 grammes) of chloral and 1 teaspoonful of laudanum.

*Cocillana*.—Wilcox<sup>106</sup><sub>Mar., '94</sub> has studied this drug during a period of four years, and finds it superior to apomorphine, except in cases of acute bronchitis when taken within the first forty-eight hours; preferable to ipecacuanha, in that it does not so readily cause nausea and a metallic taste in the mouth, and that it improves the appetite and assists in the regular movement of the bowels; immeasurably safer in any stage of acute bronchitis than pilocarpine, because it does not depress the heart-action. It may replace ipecac in every sphere of action, and in a number of cases can be substituted for apomorphine, carbonate of ammonia, strychnine, and other drugs classed as expectorants.

*Codeine*.—Vladimir Preininger<sup>116</sup><sub>Oct., '93; Mar., '94</sub> discusses the merits of this drug as a substitute for morphine. He employs it either in powder form with cane-sugar or in solution with glycerin, distilled water, and syrup. The dose is about  $\frac{1}{2}$  grain (0.03 gramme). In insomnia not dependent upon pain it is not reliable, and, should sleep be obtained, it is only for one or two hours. If sleep is prevented by pain, codeine will not give relief. In tuberculosis with painful cough, knife-like pains in chest, in the back, and between the shoulder-blades, its action is similar to that of morphine. It has no untoward effect upon the organs of digestion. In acute bronchitis in adults, the irritation was diminished and expectoration followed without pain. In children the results were unfavorable in 2 cases out of 3. In whooping-cough the best result followed in 10 apparently severe cases. In 2 cases of neuralgic pains of the lower extremity, an hypodermatic injection of codeine had less effect than one of morphine. It is yet an open question whether, after prolonged subcutaneous use, a codeinism could be developed similar to morphinism. It may be possible that there is an antagonism between these drugs, so that, if a codeinism exist, it may be restrained by morphine, whilst in morphinism codeine may be useful or, indeed, indispensable. So far as the author's observations go, after prolonged use, no unpleasant or untoward results have been noted, and hence the drug may be of more value than morphine; and, if not to be considered as a substitute for morphine, it is a remedy *sui generis*. Alois Pollak concludes<sup>116</sup><sub>Nov., Dec., '93</sub> that (1) it is by no means an inactive remedy,

in that poisonous symptoms appeared from 1-grain doses; (2) it is a very serviceable narcotic, but nothing beyond, for it is not a remedy for any disease; (3) it is not to be recommended for painful diseases, as sciatica, or a phlegmon; (4) no noteworthy action on the psychical or the nervous system has been observed in cases of withdrawal of alcohol, morphine, or arsenic, tolerance being established; (5) in inflammation of the female genitalia no result has followed its administration, and further investigation must determine whether it is of advantage to use it after the severe pain has been relieved by morphine; (6) it gives good results in most diseases of the organs of respiration, certain affections of the alimentary canal, and in inflammations of the urinary passages. J. Braithwaite<sup>3</sup><sub>v.2,p.132</sub> has found by experience that codeine exerts a very favorable action on nocturnal paroxysms of laryngeal cough, on vomiting of whatever origin, and on a form of diarrhoea peculiar to elderly women, characterized by the sudden occurrence, on getting out of bed in the morning, of a violent desire to evacuate the bowels, followed by one or two liquid stools.

A case of idiosyncrasy to codeine is reported by J. S. Duff, of Pittsburgh.<sup>233</sup><sub>June, '94</sub> The patient was given  $\frac{1}{2}$  grain (0.03 gramme) internally and  $\frac{1}{2}$  grain (0.03 gramme) by hypodermatic injection. In about an hour the patient was swollen from head to foot, face and body intensely red, as if stung by bees, and skin so hyperæsthetic that the slightest touch on any part of it caused her to cry out with pain. The lower extremities were cold and purple, with a death-like feeling, the heart-sounds feeble and irregular, and the pulse at the wrist almost imperceptible. Large doses of digitalis and whisky, with hot applications to feet and limbs, soon restored the failing circulation. In five or six hours she felt as well as if nothing had occurred.

*Codliver-Oil.*—Patein<sup>527</sup><sub>Feb.23,'94</sub> believes that it is best not to combine other drugs with codliver-oil, unless it be creasote, which has no inconveniences in being thus administered. He also advises that the dose of 3 ounces (93 grammes) should never be exceeded, that it should never be administered except in winter, and that its exhibition should, from time to time, be suspended. The sides of the glass from which it is taken should be moistened, in order to prevent the oil from adhering to the vessel. The patient should swallow it at one draught, and, after taking it, should wash the



mouth with some aromatic water. Dietrich<sup>31</sup><sub>Sept., '94</sub> gives the following formula for disguising its disagreeable taste: Codliver-oil, 1000 grammes (2 pints); essence of lemon, 5 grammes ( $1\frac{1}{4}$  fluidrachms); oil of orange-flowers, 2 grammes (31 minims); essence of English peppermint, 1 gramme ( $15\frac{1}{2}$  minims); vanillin, 0.10 gramme ( $1\frac{3}{4}$  grains); coumarin, 0.01 gramme ( $\frac{1}{6}$  grain). Dissolve the two latter in the warmed essential oils and mix with the codliver-oil.

*Copaiba.*—Szczesny Bronowski, of Warsaw,<sup>520</sup><sub>No. 20, '93</sub><sup>109</sup><sub>Nov., '93</sub> emphatically recommends copaiba balsam as a diuretic remedy in cases of cirrhosis of the liver. It should be given in the daily dose of  $1\frac{1}{2}$  drachms (6 cubic centimetres), the best form being that of emulsion. He invariably prescribes it after the following formula: Emulsionis balsami copaivæ (et. 2 drachms), 6 fluidounces (186 cubic centimetres); tincturæ menthæ piperitæ, 1 fluidrachm (4 cubic centimetres). M. Sig.: To take a spoonful every two hours.

Mendel, of Paris,<sup>14</sup><sub>Mar. 25, '94</sub> reports a case of angina due to the administration of copaiba, and accompanied by the characteristic eruption and some fever. He attributes the development of the angina to the presence of adenoid vegetations in the pharynx, predisposing to the localization of the poison in that region.

*Copper.*—W. B. Stewart, of Philadelphia,<sup>71</sup><sub>v. 3, p. 29</sub> employed arsenite of copper as an antispasmodic in whooping-cough. One tablet triturate containing  $\frac{1}{100}$  grain (0.00065 gramme) of the medicament was dissolved in 16 teaspoonfuls of boiled water, and to it were sometimes added 5 minims (0.32 cubic centimetre) of tincture of nux vomica. A teaspoonful of the mixture was given every half-hour for six consecutive hours, and then every one or two hours afterward. The results are described as surprising. The paroxysms diminished both in number and severity, and the process was checked in about four weeks.

The author reports good effects from copper arsenite in the after-pains of confinement. Of 16 cases 9 received absolute relief, 6 were greatly benefited, and 1 obtained no relief. One tablet was dissolved in 10 or 15 teaspoonfuls of water and 1 spoonful given every 10, 20, 30, or 60 minutes, as indicated.

Finally, Stewart reports good results from the use of copper arsenite in two cases of threatened miscarriage, in dysmenorrhœa, delayed menstruation, and ovarian irritation and pain. He gave the following in teaspoonful doses every half or one hour: Copper

arsenite (tabl. trit.),  $\frac{1}{100}$  grain (0.00065 gramme); tincture pulsatilla, 8 drops; tincture nux vomica, 4 drops; water, 2 fluid-ounces (62 cubic centimetres).

F. Schmidt<sup>113</sup><sub>No.22,'94</sub> tried oxide of copper as a tænofuge, using the following formula with excellent results: Black oxide of copper, 6 grammes ( $1\frac{1}{2}$  drachms); prepared chalk, 2 grammes (31 grains); alumina, 12 grammes ( $3\frac{1}{4}$  drachms); glycerin, 10 grammes ( $2\frac{1}{2}$  fluidrachms). To make 120 pills; 8 to 12 to be taken daily. The patient takes 2 pills daily for four days of the first week, and 4 pills daily for four days of the next week, abstaining during this time from drinks and acid food. A large dose of castor-oil is then given, when the tænia will be evacuated entire. Segments of the worm are passed during the two weeks of treatment.

Price<sup>59</sup><sub>No.5,'94</sub> praises the merits of sulphate of copper in syphilis, regarding it as superior to mercury in its effect on the lymphatic system. The cutaneous secondary manifestations disappear but slowly under its influence, but it prevents the development of mucous plaques and laryngeal accidents. On account of its great activity, it is advisable to interrupt the treatment one or two days in a week. Patients at first have a great appetite, but if the drug be too long continued they suffer from prostration, vertigo, and pallor, with rapid, weak pulse. Price administers the remedy in doses of 0.002 gramme ( $\frac{1}{32}$  grain) in pills or potion three times daily, adding sulphate of iron if advisable. This dose, however, is dangerous when there is a syphilitic cachexia, and smaller doses should be given to begin with, gradually increasing to 0.006 gramme ( $\frac{1}{16}$  grain) daily, as tolerance becomes established. Cervello<sup>3</sup><sub>No.52,'94</sub> has used the same dose in several cases of malarial cachexia. He also recommends the drug in chloranæmia.

*Creasote*.—W. K. Fyffe<sup>2</sup><sub>Sept.22,'94</sub> inoculated guinea-pigs with tuberculous sputum and tested the effects of creasote upon them, finding that inhalations had no effect on the virulence of the bacillus, that internal administration caused a marked decrease in the progress of the disease, and that keeping the animals in an atmosphere saturated with creasote had the effect of causing the entire disappearance of the bacilli, none being found in the body of the animal when killed, and no secondary generalization being found. The same result was obtained by subcutaneous injection

of the drug. Ch. Eloy considers one of the best formulæ for the rectal injection of creasote, to be the following, recommended by Tisé and Jules Simon: Pure beech-wood creasote, 0.40; iodoform, 0.005; salol, 0.40; dissolved in pure olive-oil, 10. The injection is to be made each day through a rectal tube, the patient being in the left lateral decubitus; the solution is to be warm; the injection must be made slowly, and carried as high as possible. The absorption is rapid. When intestinal symptoms arise this method must be abandoned.

G. D. Wilkens <sup>2096 673</sup><sub>p.39,'94; Dec., '94</sub> used Hopman's mixture in about two hundred cases, giving doses varying from 1 to 8 grammes ( $15\frac{1}{2}$  minims to 2 fluidrachms), and in about 20 per cent. of the cases from 11 to 13 grammes ( $2\frac{3}{4}$  to  $3\frac{1}{4}$  fluidrachms). In patients who were given from 700 to 1000 grammes ( $22\frac{1}{2}$  to 32 fluidounces) within four to six months, no effect upon the number and vitality of the bacilli could be observed, nor upon the course of the disease. In most of the cases the drug exercised a salutary influence, subjectively as well as objectively. Expectoration was facilitated, digestion improved, and an aperient action was noted. As soon as the drug was discontinued the patients lost ground and rapidly succumbed. Wilkens, from these experiments, recommends creasote in doses of 2 to 4 grammes ( $\frac{1}{2}$  to 1 drachm) daily as an excellent symptomatic remedy not only in cases of commencing phthisis, but in advanced stages of the disease, particularly where digestion is deranged. Sokolowski <sup>520</sup><sub>No.1,'94</sub> regards it as valuable, but by no means a specific in tuberculosis. Eck <sup>21</sup><sub>Sept.17,'94</sub> obtained encouraging results from its use in scrofulous children. Weber <sup>3</sup><sub>No.72,'94</sub> has found it of value in chronic pyelonephritis, in doses of 3 to 5 drops three times daily.

Zawadzski <sup>640</sup><sub>Jan., '94; May 26, '94</sub> reports a case in which a woman, 42 years old, was ordered creasote in doses of 6 drops three times a day, in milk. After she had taken three doses symptoms of poisoning showed themselves, including those of high irritation of the gastro-intestinal canal, anæsthesia, and partial paralysis of the soft palate and of the vocal bands, persistent burning in the mucous membrane of the mouth and pharynx, albuminuria, signs of weakness of the heart, and especially the exhalation of the odor of creasote from the mouth. Death took place in the course of four days, and was attributed by the author to an idiosyncrasy



to creasote. He expresses the opinion that creasote should not be used pure or in strong solutions, nor in milk, in which it is insoluble, acting as if undiluted. Not more than 1 or 2 drops at a dose should be ordered to begin with, this dose being gradually increased.

*Creolin*.—Mais, of Brieg, <sup>4</sup><sub>No. 30, '94</sub> prescribed creolin in a case of acute enteritis with collapse, in order to stop the putrid decomposition that was going on. The patient was given 1 teaspoonful of creolin, in a glass of boiled and cooled water, in the afternoon, and the following morning the stools were free from odor and the violent pains had diminished. On the second day of the creolin treatment numerous stony scybala covered with blood and mucus came away, which the author considered to be the cause of the decomposition. In a few days the patient was quite well.

*Curare*.—Dobrorarow <sup>3</sup><sub>June, '94</sub> cured by means of this drug a case of epilepsy in a boy of 16 years, who had suffered from the disease from infancy, the aura being a tickling sensation in the right knee. When brought to hospital the attacks occurred at intervals of a few minutes. After twelve days' trial of various measures, 0.006 gramme ( $\frac{1}{10}$  grain) of curare was injected hypodermatically, when the attacks recurred at intervals of hours instead of minutes. The patient experienced a sensation of fatigue in all the muscles of the right side of the body and a vague pain in the right knee. Six injections of curare were made at intervals of five days, in doses of 0.006 to 0.007 gramme ( $\frac{1}{10}$  to  $\frac{1}{9}$  grain), with complete recovery, which had been maintained for several months, up to the time of report.

*Cutol*.—See Aluminium.

*Dermol*.—See Bismuth.

*Diachylon*.—See Lead.

*Digitalis*.—At the International Medical Congress, Petresco, of Budapest, <sup>2022</sup><sub>'94</sub> stated that since 1880 he had treated all his cases of pneumonia by the following formula: Infusion made from 4, 5, or 6 grammes (1,  $1\frac{1}{4}$ , or  $1\frac{1}{2}$  drachms) of digitalis-leaves, 200 grammes ( $6\frac{1}{2}$  fluidounces); simple syrup, 40 grammes ( $1\frac{1}{4}$  fluidounces; a tablespoonful every half-hour. This treatment, continued for two or three days, aborts the disease and reduces the mortality to a minimum, while it is well tolerated by the patients. Zoubkowsky <sup>571</sup><sub>No. 21, '93</sub> has also used digitalis with success in the treat-

ment of pneumonia. Bloch<sup>586</sup><sub>Nos. 15, 16, 94; Nov.</sub><sup>90</sup> treated twenty-one adults and thirteen children, suffering from catarrhal pneumonia, by large doses of a strong infusion of digitalis-leaves, according to Petresco's method. The adults took a tablespoonful every hour of an infusion of 1 to 2 drachms (4 to 8 grammes) of the leaves in 8 ounces (250 cubic centimetres) of water; the children, a teaspoonful every hour of an infusion of 4 to 20 grains (0.25 to 1.3 grammes) of leaves in 2 ounces (62 cubic centimetres) of water, the former for a child aged 9 months, the latter for a child of 10 years. The adults bore these large doses very well, but the children frequently presented gastro-intestinal disturbance. In eighteen cases very favorable results were obtained; the temperature fell and the pulse was slowed one or two days before the crisis of the pneumonia. The author forms the following conclusions: 1. The doses of digitalis usually employed (7 to 12 grains—0.45 to 0.78 gramme—of leaves in 7 ounces—219 cubic centimetres—of water, a tablespoonful to be taken every two hours) have no influence upon the pulse nor upon the progress of acute pulmonary disease. 2. The strong infusions are harmless, and have a very favorable influence upon the process of the disease, and may even cut it short if administered at the onset. If the pulse and temperature are still unaltered after administering a quantity of infusion corresponding to 120 to 140 grains (8 to 9.3 grammes) of the digitalis-leaves, the drug is discontinued for one or two days in order to observe the cumulative action. The slowing of the pulse generally occurs before the fall of temperature; if the latter occur first, the administration of the drug is stopped. 3. The respiration was not slowed as in Petresco's cases, but usually became more rapid. 4. The infusion of digitalis is much less toxic than the leaves themselves. This is due to the most toxic constituent of the leaves—digitoxine—being insoluble in water, and consequently not entering into the infusion. This fact explains the difference between the results of Petresco and those of Binz, the former using the infusion, the latter the powdered leaves. 5. The following are contra-indications for the use of strong infusions: (a) Children under 1 year, on account of gastro-intestinal troubles, and also of the difficulty of properly watching the pulse. (b) Old people, on account of the great inequality of the action of digitalis in their cases,

patients over 60 are often insensible to the action of the drug, and soon present an irregular pulse of evil augury. 6. Digitalis in small doses, but long continued, is useless; a large dose is given at once and stopped when the effect is produced. It is necessary for the physician to see the patient at least once and, if possible, twice a day, in order to stop the medicine at the proper time.

Comby, of Paris, <sup>31</sup><sub>Feb. 17, '94</sub> finds that children are very sensitive to the action of digitalis, as to all active poisons, especially those affecting the nervous system. He regards it as particularly indicated in valvular diseases following endocarditis, involving either the mitral or aortic orifice. He has not found it so serviceable in nervous palpitation or the hypertrophy of growth. It may be indicated in certain affections of the respiratory apparatus, as pleurisy or hydrothorax, as it favors resorption by its diuretic action; also in cases of pneumonia, where the heart's action is feeble. In acute diseases of the kidneys digitalis should not be used, but in the chronic stages it is without danger, and of some value if carefully employed, being much less irritating to the kidney than squills or other diuretics. Besides these principal indications, the author believes that it is also useful in the acute infectious diseases and in some diseases of the nervous system, as epilepsy or acute mania. He regards the amorphous or crystalline digitaline as dangerous for children, and uses only preparations made from the leaves.

Schilling, of Berlin, <sup>22</sup><sub>Nov. 29, '93</sub> has employed digitalis as a prophylactic in cardiac cases where chloroform was about to be given. In the case of injuries to patients suffering from cardiac affections, when chloroform must be given at once and rapidly, he strongly recommends the subcutaneous injection of 1 gramme ( $15\frac{1}{2}$  minims) of a 10-per-cent. infusion of digitalis.

Pilatte <sup>3</sup><sub>Dec. 20, '93</sub>; <sup>2</sup><sub>Feb. 24, '94</sub> says that in those subject to chilblains there is always arterial hypotension with peripheral vaso-dilatation. The chief indication, therefore, is to improve the circulation. For this purpose Pilatte gives digitalis internally, from 0.5 to 1.5 grammes ( $7\frac{3}{4}$  to  $23\frac{1}{4}$  grains) of a maceration of the leaves being administered on two days of a week. Caffeine and kola are sometimes substituted for the digitalis. He also uses digitalis as a local application as follows: R̄ Tincture of digitalis, 6 grammes ( $1\frac{1}{2}$  fluidrachms);



crystallized thymol, 3 grammes (46 grains); alcohol (70°), glycerin, āā 150 grammes ( $4\frac{3}{4}$  fluidounces). Careful drying of the hands and feet, followed by friction with eau-de-cologne or camphorated alcohol, is enjoined. For the relief of the itching, tincture of iodine lightly painted on every three or four days is particularly useful. Fatty substances, including vaselin, should never be applied. Pfaff<sup>279</sup><sub>v.32, '93</sub> used digitalis in 16 cases of cardiac disease, typhoid fever, chronic nephritis, hepatic cirrhosis, etc., giving alternately an alcoholic solution 10 cubic centimetres ( $2\frac{1}{2}$  fluidrachms) of which contained 0.004 gramme ( $\frac{1}{16}$  grain) of digitaline, and an infusion of digitalis. In 13 of the cases the action of both on the circulatory organs was distinct and sometimes lasting; in the 3 other cases it had no effect. The author calls attention to the fact that both digitalis and digitaline in large doses, while increasing the blood-pressure, do not increase diuresis; hence, when it is desired to produce diuresis small doses should be given.

*Digitoxine.*—Masius<sup>52</sup><sub>July, '94</sub>; <sup>2</sup><sub>Sept. 8</sub> says that digitoxine, when given to patients suffering from cardiac affections, causes cyanosis and dyspnœa to disappear, and restores regularity, force, and volume to the pulse. These effects manifest themselves between the twelfth and twenty-fourth hour following the administration of the drug. At the end of twenty-four hours marked diuresis occurs, the amount of urine discharged sometimes amounting to four litres (quarts) in the day. The gastric derangement caused by digitoxine is trifling. The author has tried the drug in 26 cases. Six times he has, after the administration of doses varying from 0.003 to 0.0045 gramme ( $\frac{1}{22}$  to  $\frac{1}{14}$  grain), seen vomiting occur, but this soon ceased when the drug was discontinued. The digitoxine is better tolerated when given in black coffee with sugar. The remedy may usefully be prescribed in certain acute diseases, such as pneumonia and typhoid fever. In patients suffering from the former affection, it after some hours brings about a reduction of temperature and has a very favorable action on the pulse. It is equally efficacious in typhoid.

*Di-iodoform.*—See Iodoform.

*Diuretin.*—Pawinsky<sup>114</sup><sub>B.14, H.2, 3</sub>; <sup>112</sup><sub>Sept., '94</sub> comes to the conclusion, from his observations, that diuretin does not act on the innervation of the heart, as does digitalis, but in an indirect manner. By an

increase of the urine and diminution of the œdema the work that the heart has to do is lessened, and hence its action made of more use to the economy. The diuretic action is often excessive, ten to twelve quarts (litres) being sometimes passed in twenty-four hours. The maximum action begins on the fourth or fifth day. The substance is indicated in heart disease, where digitalis fails to act or cannot be taken. He uses it in aortic regurgitations, where digitalis is sometimes badly borne, and in heart disease, where there is great irritability of the nervous system. Diuretin gives better results in heart disease where there is disease of the heart-muscle than it does in valvular disease. In kidney disease it is of less value. It is most valuable, however, in high grades of interstitial nephritis, where there is high blood-pressure. The dose is about 15 grains (1 gramme), 90 grains (3 grammes) to be given daily. It is best given in solution. E. Main<sup>67</sup><sub>p.299,'04</sub> believes that diuretin owes its influence to the theobromine which it contains, and that it acts directly on the renal tissue in a non-irritating manner. McPhedran, of Toronto,<sup>39</sup><sub>June,'94</sub> has found it useful in arterial sclerosis and chronic cardiac disease, relieving œdema and mitral insufficiency.

*Djamboe*.—Hugel<sup>34</sup><sub>July 17,'94; Aug.25</sub> describes the use of this drug (leaves and cortex). Although small doses of 0.3 gramme (4½ grains) are efficient, large ones may be given without ill effects. It finds its chief use in the diarrhœa of children. In several hundreds of cases of gastro-enteritis in children the diarrhœa and vomiting rapidly improved. In five cases of severe gastro-enteritis in the adult, accompanied by vomiting, diarrhœa, low temperature, and cramps, a few doses of calomel, followed by djamboe, produced rapid improvement. In about twenty-five cases of diarrhœa in phthisis it was used with beneficial results. In two similar cases, however, it was without effect, and in two others it only acted when combined with opium. An infusion is more suitable for children, and a fluid extract for phthisical adults.

*Duboisine*.—From observations made by Cividalli and Giannelli<sup>589</sup><sub>Nos.27,28,'04</sub> it appears that sulphate of duboisine acts favorably in epilepsy, even in cases rebellious to the bromides and to atropine. Under its influence the attacks diminish in number and intensity, the psychical troubles are improved, and sometimes the mental faculties are completely restored. In two cases of epileptic coma,

in which all other remedies had failed, the drug gave brilliant results. The authors begin by injecting daily, under the skin of the back and abdomen, 0.0005 gramme ( $\frac{1}{2000}$  grain) of duboisine (half a Pravaz syringeful of a 1 to 1000 solution), increasing the dose daily by 0.0001 gramme ( $\frac{1}{10000}$  grain) until a maximum dose of 0.0015 gramme ( $\frac{1}{667}$  grain) is reached. The injections are always painful, and, in spite of the most careful antiseptic precautions, redness of the injected region appears in some cases. The prolonged use of the remedy gives rise to secondary symptoms of tolerance, such as mydriasis, dryness of the throat, and slight vertigo. The symptoms of severe poisoning, such as chill, weakness of the limbs, loss of appetite, disturbance of sensibility, were observed in only two cases after the use of a dose of 0.0015 gramme ( $\frac{1}{667}$  grain) daily. Ladislaus v. Heney <sup>113 866</sup> <sub>Nov. 7, '8, '94; June</sub> has used 702 injections of this drug in 74 cases. Only 22 injections of 3.1 per cent. were ineffective; in 37.6 per cent. a sedative and in 59.2 per cent. an hypnotic effect was obtained. The dose varied from  $\frac{1}{800}$  grain (0.0008 gramme) to  $\frac{1}{300}$  grain (0.002 gramme); in 40.3 per cent. of the injections followed by sleep, only  $\frac{1}{800}$  to  $\frac{1}{600}$  grain (0.0008 to 0.0011 gramme) was used. The therapeutic effect was noticed within twenty minutes in 60.8 per cent.; between twenty and thirty minutes in 24 per cent. The sedative effect lasted longer than the hypnotic; in some cases two or three days. Especially favorable results were obtained in the excitement of melancholia due to excessive increase of præcordial anxiety, and in the sudden paroxysms of anger in paralytic and post-epileptic delirium. Respiration and pulse were not unduly influenced. A few were nauseated; none experienced vomiting. Mydriasis and disturbance of vision occurred frequently, but were not constant. Hallucinations and delirium did not occur. Toxic effects were seen in one case after an injection of  $\frac{1}{800}$  grain (0.0008 gramme). The writer considers duboisine a more promptly acting sedative and hypnotic than most similar remedies now used. Morphine and codeine are less prompt, continuous, and reliable, while hyoscyamine and hyosine are more vehement in their action. Duboisine can be used in diseases of the heart and vessels, is not dangerous to life if carefully used, and can be discontinued suddenly without pernicious reaction. P. S. Sküridin <sup>586 2</sup> <sub>No. 21, '94; Oct. 20</sub> comes to the following conclusions: 1. Duboisine will occupy a prominent place among hypnotics for the



insane. 2. The best results may be expected in epilepsy, periodical insanity, and acute mania and mental confusion. 3. The hypnotic effect is a secondary phenomenon, developing consecutively to the subsidence of a motor or muscular excitement. Hence the drug proves most useful in insomnia caused by intense motor excitation. In sleeplessness depending upon illusions, hallucinations, or organic brain disease, but unaccompanied by distinct motor disturbances, the remedy remains inefficacious. 4. The drug is free from accessory ill effects.

E. Marandon de Montyel<sup>67</sup><sub>p.145, '94</sub><sup>5</sup><sub>May</sub> has found that the marvelous sedative effects which follow the administration of this remedy are almost always associated with a very disturbing failure of nutrition. Of 25 cases, 18 lost weight, even in the absence of all gastric symptoms, a simple diminution of appetite not being excluded. This failure of nutrition seems to be entirely independent of any influence which it may exert upon the alimentary canal. The four inconveniences of this drug are: (1) an acquired tolerance; (2) gastro-intestinal disturbance; (3) cardiac enfeeblement; and (4) denutrition. By interrupting the treatment the first difficulty is overcome. By injecting the remedy immediately after meals the second is avoided. In persons suffering from cardiac disease duboisine should be proscribed, and this constitutes the only actual contra-indication, for the denutritive influence can be considerably reduced by attention to diet, use of tonics, especially if the treatment is not of long duration. Grandferry,<sup>2031</sup><sub>'94</sub> from experiments on animals, concludes that it is an efficient hypnotic, but that it can never form the base of a systematic treatment of the excitement occurring in insane patients. Tambroni and Cappelletti,<sup>971</sup><sub>v.9, No.1</sub> who tried duboisine in sixty-two cases of insanity, find it uncertain as an hypnotic, producing only a light sleep and in no way modifying the mental condition.

*Dulcin.*—Aldehoff<sup>116</sup><sub>Feb., '94</sub><sup>2</sup><sub>Mar.31</sub> refers to this new substance, which, possessing two hundred times the sweetness of sugar, has been recommended as a substitute for it. Chemically it is a parphenetolcarbamid, and, as compared with saccharin, the bitter after-taste is wanting. However, the author disputes the indifferent action ascribed to it by other authors. Having administered 15 grains (1 gramme) daily to dogs, in order to test its innocuousness, he observed, after a few days, constitutional disturbances, such as

vomiting, anorexia, etc. The most remarkable change, however, appeared in the urine, which became dark and frothy as in icterus, no spectroscopic proof, however, being present. Death occurred in three weeks with symptoms of acute jaundice, and the author therefore advises the cautious use of the drug. He considers its unfavorable action remarkable, in view of its affinity to phenacetin.

*Ephedra Vulgaris*.—Doguel, Zawietsky, and Lewascheff, of Kazan, <sup>859</sup><sub>No.22,'94</sub> in a study of the therapeutic action of this drug, arrive at the following conclusions: 1. *Ephedra vulgaris* and *ephedra monostachya* contain a very powerful alkaloid,—ephedrine. 2. Hydrochlorate of ephedrine causes dilatation of the pupil, from weakening of action of the oculo-motor nerve upon the contracting muscle of the pupil. The cardiac beats slacken considerably, their force being at first increased, but gradually falling. This is due to weakening of the inhibitory apparatus of the heart, while the lowering of the blood-pressure is caused by diminished tonus of the vessels. The changes in circulation are observed in cold-blooded as well as in warm-blooded animals. 3. The infusions and decoction of *ephedra vulgaris* exercise the same action as the salts of ephedrine. 4. The effects of the infusion and decoction in acute and chronic rheumatism are not brilliant, and in every case observed the remedy was inferior to salicylic acid or salicylate of sodium. 5. The drug should be carefully used until its properties are better known. Bogoslawski <sup>121</sup><sub>Aug., '94</sub> considers the best preparation to be the fluid extract and the hydrochlorate of ephedrine. These should be kept in tightly-closed vessels and in a cold place, as otherwise they readily deteriorate. On account of the pupillary dilatation, which does not long continue, ephedrine might in certain cases be substituted for atropine.

*Ergot*.—Thomson <sup>242</sup><sub>Feb., '94</sub> has had successful results from the use of large doses of ergot of rye in migraine. As soon as the premonitory symptoms appeared he gave the patient 4 grammes (1 drachm) of the fluid extract, with an equal quantity of elixir of quinquina, in water, and at the same time advised him to lie down. If the pain in the head persisted he repeated the dose in an hour, and, if necessary, a third dose was given an hour later. If the remedy were vomited he gave a similar quantity by rectal injection. In several rebellious and persistent cases rapid cure

was effected in this manner, and the improvement continued if intestinal antiseptics were instituted during the intervals between the attacks.

Recalling the important rôle the vasomotor nerves play in the process of secretion, Goldenach<sup>69</sup> <sup>814</sup><sub>No. 20, '94; Aug.</sub> decided to try ergot against phthisical night-sweats, hoping that, by its well-known influence on the vasomotor nerves, it might have some effect upon the hyperidrosis. The results were highly satisfactory in the large majority of the cases, and in some really surprising. He usually administered one or two 5-grain (0.30 gramme) powders of ergot at bed-time. The sweating became very insignificant in many instances and entirely disappeared in others. The remedy rarely failed to do some good. More recently he has modified the treatment a little by using ergotine, subcutaneously, in the following formula:  $\mathcal{R}$  Ergotine, 3 parts; diluted alcohol, glycerin, and distilled water, of each 5 parts. 1 cubic centimetre (16 minims) every evening. The success of this treatment is said to be even more constant and marked than that of the administration of the powdered drug.

*Ether.*—See Anæsthetics, vol. iii, O.

*Ethyl-bromide.*—See Anæsthetics, vol. iii, O.

*Europhen.*—Oefelein and Neuberger<sup>28</sup> <sup>112</sup><sub>Nov., '93; Sept., '94</sub> have used europhen in soft sores and other conditions, their cases numbering two hundred in all. They found all kinds of wounds quickly heal under it. Great drying powers without local irritation and absence of smell are the principal advantages of europhen over iodoform, and it proved most valuable in erosions and fissures. In forty cases of balanitis, burns, etc., and in four cases of suppurative lupus, the secretion diminished considerably. In soft sores the powder was applied three times daily from the first. It adheres better than iodoform, and smaller quantities are required. Europhen was more satisfactory than aristol in phagedenic soft ulcers, but in tertiary syphilitic conditions it was inferior to calomel. In these affections a 1-per-cent. oil emulsion was also successfully injected subcutaneously without unpleasant results, iodide of potassium being simultaneously administered. Externally europhen was used as a dusting-powder, or a 3- to 5-per-cent. vaselin ointment.

*Exalgin.*—Savill, of London,<sup>6</sup> <sub>Nov. 25, '93</sub> tried this drug in twelve

cases of neuralgia and pain of various kinds, and obtained results which justify him in asserting that exalgin is an excellent analgesic, prompt and efficacious in its action, and without any injurious effects. Dujardin-Beaumetz,<sup>10</sup><sub>May, '94</sub> in replying to a question by Bougon as to the symptoms of poisoning produced by a dose of 0.50 gramme ( $7\frac{3}{4}$  grains), observed that prudence should be exercised in its administration, not more than 0.25 gramme (4 grains) being given at first, until the individuality of the patient has been tested. Like all the aromatic derivatives, it is much more active in fever patients than in apyretic subjects, and it is therefore contra-indicated in cases of pain with fever. It should be limited to cases of neuralgia, in which excellent results may be obtained from doses of 0.15 to 0.30 gramme ( $2\frac{1}{4}$  to  $4\frac{1}{2}$  grains). Cesaris recommends<sup>742</sup><sub>v.9,p.172,'94</sub> the addition of sodium salicylate, 11 parts, to exalgin, 10 parts, in water, 100 parts, as a desirable method of increasing the solubility of exalgin for hypodermatic injection.

*Ferratin.*—See Iron.

*Formaldehyde; Formic Aldehyde; Formol.*—Formaldehyde possesses antiseptic properties of the highest order, and its vapor is, besides, extremely diffusible, even through fatty substances. It is, therefore, especially suitable for the treatment of ringworm. Pottevin<sup>287</sup><sub>July, '94</sub> used it in this disease with sufficient success to warrant him in continuing the experiments. A 2-per-cent. solution was generally well borne, but no stronger could be employed. Berlioz, of Grenoble,<sup>3</sup><sub>Apr., '94</sub> tried paraform in phthisis, as recommended by Aronsohn, of Berlin, but found that it was very badly borne by such subjects. He believes that it should be named not paraform, but triformol, since it consists of one molecule of formol three times condensed. Von Winckel<sup>296</sup><sub>Apr.24,'94</sub> used formic aldehyde in one hundred and fifty-five cases of diseases of women, and is convinced that it is an efficient remedy in vaginitis and catarrhal or blennorrhagic endometritis. He used it in the form of vaginal injections, 1 tablespoonful of a 10-per-cent. solution of formol to a quart (litre) of water, together with cauterization of the cervix and intra-uterine mucosa with the same 10-per-cent. solution.

Deschamps<sup>37</sup><sub>Apr., '94</sub> has obtained excellent results in the treatment of rhinitis, otitis media, and laryngitis by passing through the nose a stream of air which had bubbled through a solution of 5 per cent. of formol in water. Blum<sup>34</sup><sub>No.32,'93</sub> finds formaldehyde a



useful antiseptic, even in weak solutions. Gegner <sup>34</sup><sub>No. 32, '93</sub> states that it is not suitable as an application to the mucous membrane of the mouth save in the extremely-diluted form, owing to its irritating odor, but on the skin a 2½-per-cent. solution may be employed. It is recommended also in cases of psoriasis, lupus, etc., as a local application. W. W. Alleger, of Washington, <sup>6</sup><sub>June 30, '94</sub> recently investigated the action of formalin, which is the name of a 40-per-cent. solution of formic aldehyde, and he believes that it is superior in its germicidal action to corrosive sublimate in solutions of a strength which can be well tolerated. Arguing that diphtheria is primarily a local disease which has been treated with some success (but also some danger) by sprays of perchloride of mercury, he has been testing the action of formalin upon cultures of the diphtheria bacillus, and finds that the spray of a solution as dilute as 1 in 2000 is sufficient to sterilize a culture. He further states that it is of value in bacteriological class-work and in the sterilization of instruments, as well as for the hardening and preservation of tissues for microscopical purposes. Although not recommended for internal use, he says that he has used a 1 to 500 spray upon his own throat without ill effects, and he thinks that a spray of this strength might be of service in diphtheria, especially if combined with the local application to the patches of a 1- or 2-per-cent. solution. These researches are in close accord with those of Slater and Rideal <sup>6</sup><sub>Apr. 21, '94</sub> upon the antiseptic action of formaldehyde.

*Formanilid.*—I. Preisach <sup>622</sup><sub>No. 36, '93</sub> treated 19 cases with this new local anæsthetic, failure being met with in 3 cases. Applications of a 50-per-cent. solution were followed by anæsthesia lasting from eight to ten hours. The patients rarely felt any pain after the second or third hour. An alcoholic solution of from 30 to 50 per cent. was utilized for laryngoscopical examination, and a 2-per-cent. solution for tonsillitis and acute or chronic pharyngitis. The after-effects were slight and transient. Kossa, Tauszk, and Meisels <sup>1130</sup><sub>H. 2, '94</sub> find that the antineuralgic action of formanilid, in doses of 0.10 or 0.15 gramme (1½ or 2¼ grains), is equal to that of morphine. Meisels employed it as a local anæsthetic in the ureter, and in one case its injection into the bladder caused cyanosis.

*Fuchsin.*—S. Lewaschew, of Kazan, <sup>673</sup><sub>May, '94</sub> having failed with serotherapy, essence of turpentine, and guaiacol, internally and externally, tried fuchsin with success in typhus exanthematus.

He found the drug harmless, observing no toxic phenomena with doses of 1 gramme ( $15\frac{1}{2}$  grains) daily. From the second or third day of the treatment, rarely later, the temperature fell progressively, the secretion of urine was increased, and the general condition of the patients was notably improved. In a few days the temperature-curve was normal and recovery was assured. The author, therefore, believes that if fuchsin be carefully administered, 1 gramme ( $15\frac{1}{2}$  grains) daily, divided into six to twelve doses, the fever may be shortened and its evolution even arrested. In his opinion the remedy may also be found of value in cases of subacute septicæmia, where micro-organisms exist in the blood.

*Gallanol.*—P. Cazeneuve, of Lyons, <sup>10</sup><sub>Oct. 31, '94</sub> communicates an article on the toxic and microbicidal properties of gallanol, his conclusions being as follow: 1. Gallanol in excess completely kills micro-organisms. 2. In a solution of 1 to 500 it arrests or diminishes the growth of certain microbes, allowing others to grow in all their vigor, the pyocyaneus and the bacillus coli being among the latter and the Eberth bacillus among the former. The anthrax bacillus and the streptococcus aureus grow feebly. 3. Gallanol is toxic only in large doses, a dog weighing 10 kilogrammes (22 pounds) not being killed by a subcutaneous injection of 5 grammes ( $1\frac{1}{4}$  drachms) of gallanol rendered soluble in water by means of sodium. 4. Although the parasitic nature of eczema and psoriasis has not yet been proven, they are both amenable to the influence of gallanol. Gonnon <sup>2071</sup><sub>'93</sub> used it for the treatment of these diseases, with excellent results.

*Glycerin.*—Ferrand <sup>17</sup><sub>May 8, '94</sub> has obtained good results with glycerin in the treatment of hepatic colic. On the appearance of an attack he administers by the mouth from  $\frac{1}{2}$  to 1 ounce (15 to 30 grammes) of glycerin. He believes that the drug is rapidly conveyed to the liver, where it exerts a marked cholagogue effect and thus aborts the attack of colic. One to 3 drachms (4 to 12 cubic centimetres) of glycerin daily, in some alkaline water, it is stated, is sufficient to prevent a recurrence of the attacks.

*Glycerophosphates.*—Since 1888 Robin, of Paris, <sup>10</sup><sub>Apr. 24, '94</sub> has experimented with the glycerophosphates of calcium, sodium, and potassium, either isolated or associated, and both subcutaneously and through the stomach, and asserts that their influence on nutrition is indisputable. The hypodermatic injection of 0.25

gramme (4 minims) of glycerophosphate of lime increases the total residue of the urine, the only ingredients remaining unaffected being the uric and phosphoric acids, the latter appearing to undergo diminution. The glycerophosphates seem to act antagonistically to antipyrin, which is the remedy for heightened nervous excitability. Their action when swallowed is less marked than when they are introduced into the system through the lymphatics. He has found them especially useful in depressed conditions, in nervous asthmas from various causes, in phosphaturic albuminuria, phosphaturia, Addison's disease, in uric-acid diathesis, and in facial neuralgia. In ataxia they seemed to diminish the fulgurant pains. The dose injected was from 0.20 to 0.25 gramme (3 to 4 minims) per diem. The only local reaction was some pain.

P. Cornet, of Paris, <sup>73</sup><sub>Aug. 11, '94</sub> gives the method of preparing the glycerophosphates. The glycerophosphoric acid is first made by leaving for six days, at a temperature of 100° to 110° C. (212° to 230° F.), a mixture composed of 3600 grammes (7½ pints) of pure glycerin at 28°, and 3000 grammes (6 pints) of phosphoric acid at 60°. The mixture is shaken thoroughly three or four times a day. On the second day it becomes colored and emits a vapor; on the fifth day it is brown and ceases to give out vapor. On the seventh day, after the mixture has been allowed to cool, it becomes clear and transparent, when it is saturated with milk of lime, formed of 500 grammes (1 pint) of carbonate of lime and 2 litres (quarts) of water. This saturation must be done slowly in large vessels, owing to the size of the mass caused by the setting free of CO<sub>2</sub>. The process is about complete in two days, when the preparation is filtered and neutralized by a weak solution of milk of lime, then precipitated by alcohol at 90°. It is then gray in color, resembling glycerole of starch. It is poured out at the end of an hour and thoroughly tested, then redissolved in water in order to allow the evaporation of the filtered solution to take place at a very low temperature. The phosphoglycerate of lime (G<sub>5</sub>H<sub>7</sub>, PhO<sub>6</sub>, 2CaO + 2H<sub>2</sub>O) is a white powder, slightly crystalline, soluble in 15 parts of cold water, almost insoluble in boiling water, and insoluble in alcohol.

*Gossypium Herbaceum*.—Narkevitch has used this drug since 1888, and regards it as a valuable hæmostatic. <sup>31</sup><sub>Sept. 26, '94</sub> Both Pote-

ienko and himself have found that it can be successfully employed in the hæmorrhage of pregnancy, in which it probably causes a diminution in the hyperæmia of the mucous membranes. The maximum dose is 30 drops of the fluid extract. Narkevitch has had more positive results from a fresh infusion—15 to 180—than from the fluid extract, a tablespoonful being given every hour or half-hour.

*Guaiacol*.—Gilbert and Morat <sup>17</sup><sub>p.753,'93</sub> <sup>814</sup><sub>Feb., '94</sub> state that crystals of pure guaiacol are white and hard; they melt at 28.5° C. (83.3° F.) and boil at 205° C. (401° F.). When melted, the guaiacol remains in fusion for an indefinite time. It is soluble in most of the organic solvents, even in benzin; it is also soluble in petroleum ether, and crystallizes very well on the evaporation of this solvent. Anhydrous glycerin dissolves crystalline guaiacol in large proportions.

Experiments with crystalline or synthetic guaiacol were first made on animals, and the remedy was then used in phthysical patients in various stages of the disease. The daily doses were of 0.40 to 1.2 grammes (6 to 18½ grains) and were given in the form of pearls, each containing 0.2 gramme (3 grains) of the medicament in oily solution, directly before meals. The stomach is said to tolerate synthetic guaiacol well, as a rule. Large doses sometimes provoke vomiting. S. Winghöffer <sup>953</sup><sub>No.34,'94</sub> states that, when absolutely-pure, crystalline guaiacol has little taste or smell and is easily taken by patients. It can be obtained in an absolutely-pure condition from a commercial sample by cooling with a mixture of ice and salt, and then separating the crystals which have formed.

The cutaneous application of guaiacol as an antipyretic, advocated by Sciolla, <sup>1177</sup><sub>v.1,p.171,'92</sub> has been tried extensively during the past year. Robilliard, of Lille, <sup>55</sup><sub>Sept.16,'93</sub> found it to have a much more rapid antipyretic effect when thus used than sulphate of quinine. Guinard, of Lyons, <sup>67</sup><sub>Oct.30,'98</sub> gives the result of experiments which, he thinks, shows that it acts by influencing the peripheral termination of nerves, and, through them, the thermogenic centre, on its application to the skin. The presence of guaiacol in the urine he attributes to the absorption of the vapors through the respiratory organs. He points out that the influence of guaiacol, like that of quinine, is chiefly seen in febrile conditions. Desplats <sup>220</sup><sub>Jan.6,13,'94</sub>



found the local application of guaiacol valuable not only in reducing febrile temperature, but also in certain painful affections, such as sciatica and rheumatism. The application, however, sometimes gives rise to pain and irritation, and it has, therefore, at times been used with an equal quantity of glycerin. Balzer and Lacour<sup>14</sup><sub>Apr. 11, '94</sub>; <sup>673</sup><sub>July, '94</sub> have used with advantage, in the treatment of epididymitis, an ointment composed of 2 to 5 parts guaiacol and 30 of vaselin. Although the effects were not as rapid as when pure guaiacol was used, they were entirely satisfactory. The pain rapidly disappeared, the temperature fell to normal, and sleep became possible. These good results may be explained by the local action exercised upon the cutaneous nerve-terminations and the reflex action upon the cord and testicle, rather than by the absorption of the drug. They had found that pure guaiacol caused considerable local irritation. Linossier and Lannois, of Lyons,<sup>31</sup><sub>Feb. 7, '94</sub>; <sup>673</sup><sub>Mar., '94</sub> find that, after painting the skin with 2 grammes (31 grains) of guaiacol, elimination by the kidney is manifested in a quarter of an hour; the proportion in the urine is greatest in from one and a half to four hours after and reaches 3.3 grammes (50 grains) per litre (quart). It decreases rapidly in six or seven hours, and in twenty-four hours there is no further trace in the urine. The total proportion eliminated reached 1.11 grammes (17½ grains) of the quantity used (55 per cent.). From a practical stand-point, external application of the drug may be substituted for internal or subcutaneous use or to complete the effect of either of these methods of administration. It is necessary, however, to cover the painted surface with an impermeable layer of taffeta, in order to assure absorption, and to repeat the painting frequently, as elimination of the guaiacol absorbed takes place very rapidly.

Stourbe, of Lyons,<sup>211</sup><sub>July 16, '94</sub> finds that pure guaiacol passes rapidly into the urine, whilst after the application of a mixture with glycerin it appears much more slowly. Almond-oil interferes much less with absorption than glycerin. Ferrand,<sup>26</sup><sub>July 2, '94</sub> states that, when analgesic effects only are sought, the guaiacol should be used with equal parts of glycerin; but if, on the contrary, it be desired to produce an antithermic action, the drug ought to be used pure or else mixed with some vehicle that lends itself readily to dermic absorption. Caporali,<sup>589</sup><sub>No. 175</sub> finds that external applications of guaiacol increase the utilization of albuminoids by the organism and

the absorption of fat and diminish oxidation. Da Costa, <sup>9</sup> Jan. 27, '94; <sup>90</sup> Aug. on painting the skin with guaiacol in a case of typhoid fever, found the temperature fall from 105.4° to 98.6° F. (40.8° to 37° C.) in three and a half hours without any disturbance of the circulatory or nervous system. Afterward the drug was used about twice daily, a fall of temperature occurring each time. In pneumonia the effect was not so marked. The antipyretic effect is slower than that of the bath, but more permanent. No delirium followed the use of the drug; sweating occasionally happened in some cases. Chilly sensations were noted as the temperature fell. He would apply guaiacol in febrile cases where the fear of moving the patient or the presence of diarrhoea or intestinal hæmorrhage prevents the use of the cold bath. He recommends that, after washing with soap and water, 30 drops be slowly rubbed in the skin of the abdomen or thigh or painted over the surface, then covered with lint or wax-paper. Fifty drops should be a maximum amount. The author observed no signs of kidney-inflammation, but advises that the urine should be watched carefully. The unpleasant odor caused by the drug may be to some extent overcome by the addition of oil of cloves.

Friedenwald and Hayden <sup>1</sup> Apr. 14, '04 tried guaiacol externally in 8 cases of pneumonia, 2 of typhoid, 2 of pulmonary tuberculosis, 1 of malarial fever, 2 of influenza, 2 of rheumatism, 1 of erysipelas, and arrive at the following conclusions: 1. That this drug has a powerful antipyretic action, occasioning a temperature-reduction of from 1° to 4° F. (0.55° to 2.2° C.) in from one to four hours. 2. That in all cases this reduction of temperature is accompanied by profuse diaphoresis, which may or may not be accompanied by a chill or chilly sensation. 3. That great exhaustion is frequently produced. 4. That the effects may be obtained from comparatively small doses (from 30 to 50 drops) and that great care should therefore be exercised, the drug being applied but once or twice daily, the initial dose not exceeding 30 drops. 5. That the effect produced by guaiacol, though more powerful, is the same as that obtained from most of the other antipyretics of the coal-tar series, and that the same care must therefore be exercised as with the other preparations. Its effect differs from the stimulating cold bath in being depressant. 6. That the main indication for its use is in diseases accompanied by high fever in which the cold bath

cannot be applied. It may therefore, be especially useful in typhoid fever, as well as in all other diseases accompanied by high fever in which irritability of the stomach prevents the use of other antipyretics.

Cases in which guaiacol was used externally for various affections with good results are reported by Courmont, of Lyons <sup>211</sup><sub>Dec.31,'93</sub>; A. H. Carter, of Birmingham <sup>2</sup><sub>July 7,'94</sub>; Montagnon, <sup>228</sup><sub>No.8,'93</sub>; Aporti, <sup>505</sup><sub>No.75,'94</sub> and Kravkoff. <sup>586</sup><sub>No.16,'94</sub> C. A. Dana, of New York, <sup>59</sup><sub>June 23,'94</sub> observed that guaiacol had more effect in modifying the temperature about the beginning than toward the end of the acute fever. In pneumonia it seemed that rubbing guaiacol on the skin about the fourth or fifth day hastened the crisis, which was less typical than usual. By using the agent three or four times a day the temperature could be kept under control. He is not prepared, however, to say that the drug used in this manner has any positive therapeutic value, but in some of his cases of tuberculosis it certainly had added to the comfort of the patients. W. S. Thayer, of Baltimore, <sup>9</sup><sub>Mar.31,'94</sub> believes that, owing to the disagreeable effects of the immediate application of guaiacol—sweating and chilliness—and the weakening effects of the continued use, its employment as an antipyretic, as in the case of carbolic acid and creasote, will probably have but a limited application. Stolzenburg <sup>4</sup><sub>Jan.29,'94</sub> does not recommend the use of guaiacol, as he finds that, although the fall of temperature is very marked, the sweating and consequent rigors are very severe, and the influence on the disease is not lasting.

Oscar Wyss, of Zurich, <sup>69</sup><sub>Mar.28,'94</sub>; <sup>80</sup><sub>Aug.15</sub> reports the case of a girl, 9 years of age, who had been accidentally given 5 cubic centimetres ( $1\frac{1}{2}$  fluidrachms) of guaiacol. In a short time she became unconscious; the conjunctivæ became injected, the corneal reflexes diminished, and the pupils no longer reacted to light; there were frequent attempts at vomiting, and the saliva flowed from the mouth in large quantities. The pulse became rapid, the sensibility of the skin much diminished. Finally, the patient began to vomit; the physician detected the odor of guaiacol. The stomach was washed out, but she did not rally. The cyanosis gradually diminished, and instead of it a deadly pallor was observed; the respiration became frequent. Three and a half hours after the guaiacol had been swallowed the patient passed

100 cubic centimetres ( $3\frac{1}{4}$  fluidounces) of brownish-red urine. The spleen and liver soon enlarged, and the temperature fell to  $35.5^{\circ}$  C. ( $96^{\circ}$  F.) and small hæmorrhages were observed upon the skin of the arms and legs. The urine contained albumin, blood, and casts, and Ehrlich's carbohc-acid test was positive. Jaundice soon appeared, the stupor increased, and the patient died on the third day. The autopsy revealed an acute gastritis and enteritis, parenchymatous degeneration of the liver, acute hæmorrhagic nephritis, parenchymatous degeneration of the heart-muscle, and ecchymoses in the pleura, peritoneum, endocardium, and pericardium; the spleen was much enlarged. Kobert<sup>2097</sup> points out that after 1-gramme ( $15\frac{1}{2}$  minims) doses of guaiacol, slight appearances of poisoning may supervene. These are characterized by a burning feeling in the stomach, nausea, etc. In one case, in which 15 grammes ( $3\frac{1}{4}$  drachms) were accidentally taken by a patient in the Dorpat Clinic, the stomach was immediately washed out and the patient was rescued. However, unconsciousness set in, the pupils became contracted, the breathing irregular, and the intensely-dark appearance of the urine was very noticeable. Von Mosetig-Moorhof<sup>69, 794</sup> injected 1 gramme ( $15\frac{1}{2}$  minims) of a mixture of guaiacol, 150 parts, and iodoform, 20 parts, into the knee-joint of a girl of 8 years suffering from fungous arthritis. Cyanosis, dyspnœa, loss of consciousness, nausea, and temporary amaurosis supervened, though Winckler had assured him that he would not hesitate to inject as much as 20 grammes (5 fluidrachms) of the mixture into the tuberculous area. Mosetig-Moorhof states that he has seen fatal accidents follow the injection of several Pravaz syringefuls of the same fluid, the patients dying an hour afterward in profound coma, with every symptom of cardiac paralysis. However, he does not deny that the mixture has a most extraordinary antituberculous action.

Ballard and Vedel<sup>348</sup><sub>No. 38, 94</sub> describe a new derivative of the drug—phosphite of guaiacol—obtained by the action of trichloride of phosphorus on guaiacol. An injection of 8 grammes (2 fluidrachms) cause no toxic effect in the dog. The authors therefore believe that its innocuous character will render it valuable in therapeutics.

*Gymnema Sylvestris*.—This plant of the East Indies has been recommended for disguising the taste of bitter substances, either in



the form of a fluid extract or as a watery solution. It does not affect the taste of acids, salt, or astringents. Suchannek <sup>116</sup><sub>Aug., '94</sub> used it with success in the parageusia of diabetes. It here, no doubt, paralyzes, temporarily, the nerve-fibres of the sense of taste for sugar. Von Oefele <sup>357</sup><sub>Mar. 29, '94</sub> advises the use in parageusia of 0.1 gramme ( $1\frac{1}{2}$  grains) of gymnesic acid in sufficient alcohol to dissolve it, added to 4 grammes (1 drachm) of tea-leaves. The leaves are then dried at a moderate temperature and kept in wooden boxes. The patient places a couple of leaves in the mouth, when the effect will be produced in a few moments, increasing for a few hours, and completely disappearing within twenty-four hours. Rabow, <sup>116</sup><sub>Aug., '94</sub> however, has had no good results from the use of the drug in such cases.

*Hydrastis Canadensis*.—Hydrastinine, which is prepared by oxidizing hydrastine, the alkaloid of *hydrastis Canadensis*, having been found useful in many cases of uterine hæmorrhage due to various pathological conditions, a series of observations has been undertaken by Kallmorgen, <sup>6</sup><sub>June 16, '94</sub> in Gusserow's gynæcological clinic, during the last two years and a half, with the object of determining the precise conditions under which the drug in question may be relied upon. Altogether it was given in eighty-six cases of uterine hæmorrhage, the form employed being  $\frac{1}{2}$ -grain pills, one of which was ordered three times a day. The treatment was, as a rule, well borne, but the patients frequently complained of painful uterine contractions and sometimes of slight gastric disturbances. The most constant and remarkable effects were observed in hæmorrhage due to retro-uterine hæmatocele, an immediate arrest of hæmorrhage being obtained in all the five cases of this character. In functional menorrhagia considerable success was obtained; here two pills daily were ordered a day or two before the expected period, with directions that three were to be taken as soon as it commenced and continued until its cessation. In hæmorrhage after abortion hydrastinine was usually efficacious, as also in cases due to lesions of the appendages. It was, however, of far less benefit in hæmorrhage due to chronic endometritis, to commencing abortion, and to uterine fibromata, though in all these classes of cases it sometimes proved useful. With hæmorrhages due to malignant disease no effect at all could be traced. The experience of H. C. Wood <sup>112</sup><sub>Aug., '94</sub> shows that hydrastinine is distinctly more power-

ful than ergot; the arrest of hæmorrhage is so prompt that it can hardly be due to vascular contraction alone, and there seems no reason to doubt that the alkaloid is a powerful ecbolic.

*Hydrogen.*—J. Lewis Smith<sup>59</sup><sub>Mar. 10, '94</sub> has found hydrogen dioxide superior to any other agent in cleansing the fauces and nostrils in cases of diphtheria or pseudodiphtheria. He prepares it as follows: Two fluidounces (62 cubic centimetres) of peroxide of hydrogen are placed in one bottle, and 15 grains (1 gramme) of bicarbonate of sodium and 2 fluidounces (62 cubic centimetres) of lime-water in another bottle. Mix together a teaspoonful from each bottle at the time of spraying—every half-hour or hour. Williams, of Boston,<sup>5</sup><sub>Nov., '93</sub> in the treatment of membranous throat affections advocates the use of strong and acid solutions of peroxide of hydrogen. He believes that solutions of 25 to 50 volumes are of value not only through their germicidal influence, but also through their power of breaking up the membrane which is already formed. Great acidity is not needed,  $\frac{1}{2}$  per cent. to 1 per cent. being quite sufficient. A strong solution can be made by evaporating a 10-volume solution in an open dish over a water-bath until it is sufficiently concentrated.

Bœennecken<sup>69</sup><sub>Jan. 11, '94</sub> advises, for the disinfection of the mouth in febrile and wasting diseases, the use of peroxide of hydrogen, which is non-toxic, free from irritant properties, and is an efficient antiseptic in solutions as weak as 2 per cent. or even less. It destroys fœtor in a few minutes, and its continuous use is followed by a decided improvement in the condition of the mucous membrane of the mouth in twenty-four hours. In the discussion which followed the reading of his paper, Leo stated that he had also obtained good results with the drug, but that in chronic cases solutions stronger than 2 per cent. acted more favorably. Walters spoke highly of peroxide of hydrogen in 5- to 10-per-cent. solutions in mercurial stomatitis. P. Schiloff, of St. Petersburg,<sup>209</sup><sub>No. 7, '94</sub> studied the action of the drug on various pathogenic bacteria, and concluded that it approached corrosive sublimate and was far superior to carbolic acid in bactericidal power. Krowczyueski, Uhma, and Swiatkiewicz<sup>551</sup><sub>p. 12, '93</sub> found it valuable in preventing syphilitic infection.

*Hyoscine.*—Bela Nagy<sup>622</sup><sub>Nov. 8, 9, '94</sub> tried this drug in five cases of hystero-epilepsy, and found that it would abort an incipient attack

and one already developed. It usually produced sleep, and caused no disagreeable symptoms. The effect was observable in from five to twenty minutes, a dose of 0.001 gramme ( $\frac{1}{64}$  grain) usually being sufficient. Tolerance was not established. Gordon Sharp<sup>15</sup><sub>Jan., '94</sub> found the clinical effects of hyoscyne to resemble in every way those of atropine.

*Hyoscyamine*.—Personal observations on this remedy have been published by Siemens<sup>22</sup><sub>Aug. 29, '94</sub> and W. P. Spratling,<sup>59</sup><sub>Jan. 27, '94</sub> the latter formulating the following conclusions: It should never be given in doses of any size in acute diseases of the mind nor in any disease in which the least degree of inflammatory action or congestion is going on, especially in the brain or its membranes. It should not be given to a patient who is exhausted or likely to become so. It should not be given in any case for the purpose of producing sleep. It has not been shown by any authority to have any hypnotic properties. Its use is advisable only in chronic diseases of the nervous system, to quiet excessive tremor, and in chronic diseases of the mind where motor disturbances take precedence over disturbances of the sensorial centres.

*Hypnotism*.—Wetterstrand, of Stockholm,<sup>14</sup><sub>May 30, '94</sub> entertains the theory, contrary to that of Liébeault, Bernheim, and others, who believe suggestion, and not sleep, to be the essential element of hypnotism, that excellent results may be obtained in the neuroses by procuring prolonged sleep for several weeks by means of hypnotism. This sleep is without inconvenience, and the patient willingly submits to it, even longer than is necessary. He should be watched by a sympathetic person, who can administer sufficient nourishment at proper times without awakening him, and who will prevent any conversation being carried on with him. As to the evacuations, these can easily be made at periods fixed upon by suggestion. Bérillon, of Paris,<sup>241</sup><sub>Sept., '93</sub> reports a case of onychophagia and self-abuse in a girl of 12 years, entirely cured in three *séances*, at intervals of eight days, cure being maintained for several months, up to the time of the report. Gorodichze<sup>241</sup><sub>Aug., '93</sub> cured a case of claustrophobia in a neuropathic patient by the same measure. Axtell, of Newton,<sup>19</sup><sub>Oct. 7, '93</sub> calls attention to the good effects obtainable in obstetrics by hypnotism. According to him, simple suggestion in a sleeping state is usually sufficient, but when the pains are very severe an hypodermatic injection of morphine

may precede hypnotism, or, to produce the best results, the morphine may be both preceded and followed by hypnotism.

Brunnberg, <sup>2099</sup><sub>'93</sub> from his personal experience and that of others, believes that hypnotism may be of inestimable service in the moral education of backward children. D. Weisz <sup>866</sup><sub>Mar.</sub> <sup>84</sup><sub>Nos. 38, 40, '94</sub> reports a number of cases of functional neuroses, one of angina pectoris, and one of athetosis treated by suggestion during hypnotic sleep. The latter two cases were temporarily greatly improved. He justly remarks that suggestion is a symptomatic treatment only, similar in action to an hypodermatic injection of morphine in a case of neuralgia, and, like it, often followed by a complete cessation of symptoms. He does not believe that the original disease (hysteria, neurasthenia) can be influenced nor the normal balance restored to a nervous system disturbed by a vicious heredity or acquired instability.

Enrico Morselli, of Genoa, <sup>2098</sup><sub>July 15, '94</sub> in a paper on the indications of hypnotism, states that, while its value in therapeutics is incontestable, its applications are not extensive and its effects are not constant. He has observed cases in which the hypnotic *séance* was badly conducted, too violent, or too frequently repeated, in neurasthenic subjects or those enfeebled by epilepsy, hysteria, etc., and was followed by physical and mental accidents and even convulsive attacks. Insanity does not seem to be amenable to hypnotism, in his opinion, but in organic troubles it acts well upon a subjective symptom, such as pain, doubt, want of appetite, etc.

*Ichthyol.*—Rudolf Abel, <sup>50</sup><sub>No. 13, '93</sub> <sup>5</sup><sub>Feb., '94</sub> from careful experiments in the laboratory, has reached the following conclusions: 1. The ichthyol preparations (ammonium and sodium) in weak solutions and in a short time destroy the pyogenic and erysipelas streptococci. The action of various commercial preparations is practically identical. Ichthyol is used with success in the suppuration from these cocci. 2. The staphylococcus aureus and albus, the bacillus pyocyaneus, the bacillus of typhoid, ozæna, and anthrax, and the spirillum of Asiatic cholera show more or less resistance to ichthyol, in that when pure it must act upon them by the hour in order to destroy these organisms in cultures. 3. The diphtheria bacillus in fresh colonies is easily destroyed by weak ichthyol solutions, while mature ones are acted upon with difficulty. Therefore it is useful in diphtheria only in prophylaxis. 4. Ich-



thyol has rendered good service in the treatment of typhus and ozæna, although it can only with difficulty make harmless these infections. 5. It is recommended that it should be preserved only in substance or in a 50-per-cent. solution; weaker solutions may be culture-mediums for micro-organisms, as the staphylococcus aureus. Weak solutions should be sterilized by heat, which has no influence upon its properties. Helmers<sup>20</sup><sub>B.135,H.1</sub> made a number of experiments on himself to determine the influence of ichthyol on nutrition, and found that it affected but slightly the separation of albuminoids and that it limited their decomposition and favored assimilation. A third of the sulphur contained in the drug is eliminated by the urine, while the ichthyol passes out in the fæces. P. Colombini<sup>686</sup><sub>Nos.5,7,'93</sub> considers ichthyol the best-known remedy for genito-urinary affections of blennorrhagic origin. He used it in 110 cases, 80 of which were men affected with blennorrhagia in various stages, and 30 were women showing inflammation of all parts of the genital apparatus. The men were given urethral injections of an aqueous solution (1 to 4 per cent.), while tampons, soaked in 10-per-cent. glycerole of ichthyol, were introduced into the vagina of the female patients. The results were brilliant. Only 7 of the men were not cured, though improved, the rest leaving hospital entirely recovered after a treatment of from fifteen to thirty days. The women were cured without exception. The recovery was verified in each case, not only by clinical signs, but by microscopical examination. H. Lohnstein<sup>116</sup><sub>Apr.,'94</sub> concludes that ichthyol in hot solutions, for urethral use (0.5 to 2 per cent.), is very valuable in acute urethritis, especially in those cases where the mucous membrane is very sensitive. In subacute urethritis, where the lesions are circumscribed, local applications (with the aid of the endoscope) render great service. Ichthyol suppositories, in the majority of cases, cause the inflammatory symptoms to disappear in the course of a prostatitis. In chronic urethritis, with infiltration, ichthyol by itself is inefficacious, but associated with the mechanical treatment, or alternating with it, it appears to be of great benefit. Administered internally, it does not have any beneficial effect on nephritis or pyelitis. R. Coltman, Jr., of Pekin, China,<sup>673</sup><sub>Mar.,'94</sub> however, reports three cases of nephritis in which it rendered great service. Jullien, of Paris,<sup>673</sup><sub>May,'94</sub> has employed ichthyol with success in the blennorrhagic urethritis

of women. He applies it by means of a metallic stem, the extremity of which is wrapped with cotton previously soaked in ichthyol. He passes and repasses the instrument into the urethra with a certain degree of force. He also uses ichthyol to kill the gonococcus in the vagina or uterus. In cases of primary and secondary catarrh of the bladder, Colosanti<sup>589</sup><sub>Jan. 12, '94</sub> washed out the viscus with  $\frac{1}{2}$ - to 1-per-cent. solutions of ichthyol. He found that by this means pain was relieved, micro-organisms were destroyed, and ammoniacal fermentation prevented. Further, the catarrhal condition of the mucous membrane was modified and urinary troubles relieved. He uses a 2- to 5-per-cent. solution. A. D. Sinclair<sup>99</sup><sub>Feb. 8, '94</sub> finds a 50-per-cent. dilution with glycerin the best in congested states of the female pelvic organs, while Storer<sup>99</sup><sub>Aug. 2, '94</sub> considers the pure drug more satisfactory and reliable.

Victor Cebrian<sup>503</sup><sub>Dec. 17, '93</sub>; <sup>2</sup><sub>Mar. 17, '94</sub> has, for more than a year, treated every case of erysipelas, whether idiopathic or surgical, which has come under his care, with ichthyol, without any other treatment, external or internal. He paints the affected parts morning and evening with collodion, to which ichthyol has been added in the strength of 10 per cent., the application being made so as to cover the healthy skin for an extent of three centimetres around the affected patch; the application is always made from healthy to diseased skin. The effect is to relieve tension, reduce temperature, and generally to subdue the symptoms of the disease. In eighty cases in which the author has used this method it has not failed once. When the varnish comes away the skin is left in a healthy condition, desquamation being trifling or none, and no roughness of surface being left. No bad effects of the treatment have been observed. Zelewski<sup>673</sup><sub>Mar. '94</sub> has also found the drug efficacious in every form of erysipelas; while Lanz<sup>214</sup><sub>No. 9, '94</sub> cured a case of urticaria by 0.2 gramme (3 grains) internally, the eruption quite rapidly disappearing.

A. Garofalo<sup>589</sup><sub>No. 30, '94</sub>; <sup>814</sup><sub>June, '94</sub> has used it successfully by hypodermatic injection in chronic articular rheumatism, sciatica, and obstinate lumbar myalgia, adopting Damien's formula: Ichthyol, 3 parts; sterilized water, 100 parts. Of this, 0.5 to 2 cubic centimetres ( $7\frac{3}{4}$  to 31 minims), according to the articulation affected, were injected during the height of the pain. He almost always observed a diminution of pain subsequent to this injection, but

never a complete suppression. He thinks that Damien's formula is serviceable, in individuals in whom morphine is contra-indicated, and as a prophylactic against morphinomania.

Sonnenburg<sup>3</sup><sub>No.52,'94</sub> used a 2- to 3-per-cent. solution as a gargle every ten or fifteen minutes in forty cases of acute pharyngitis, the inflammation disappearing in from twelve to twenty-four hours.

Colin<sup>69</sup><sub>No.14,'94</sub> calls attention to the favorable effect of ichthyol on the course of pulmonary tuberculosis, and the advantage of giving it to poor patients who cannot afford the expense of a creasote treatment. He prescribes 20 grammes (5 drachms) with an equal quantity of distilled water, 4 drops to be taken three times daily in the beginning, before meals, the dose being gradually increased a drop at a time until 40 drops three times daily are reached, if necessary, the patient being kept at this point as long as possible. Children from 5 to 12 years old may be given half this amount. Care must be taken to administer the drug in plenty of water. Pills and inhalations may be prescribed for well-to-do patients, though pills are less efficacious and cause eructations, which is the only inconvenience of the remedy.

*Indian Hemp.*—See Cannabis Indica.

*Iodate of Sodium.*—See Sodium.

*Iodic Acid.*—J. Ruhemann<sup>28</sup><sub>Apr., May,'94</sub> finds that iodic acid, valuable externally as an hæmostatic (in 5-per-cent. solution), is very serviceable for surgical purposes as a caustic pencil in ulcerations of the penis and mucous membranes, ulcers cruris, chronic hypertrophic pharyngitis, etc. In the nose, larynx, and uterus 10-per-cent. solutions or ointments may be employed; for instillation into the conjunctiva 5-per-cent. solutions; for injections in gonorrhœa, especially with the addition of cocaine, 0.05- to 0.1-per-cent. solutions; and as gargle and wash in angina, diphtheria, mucous-membrane ulcers, etc., a dilute solution is serviceable. The subcutaneous injection of iodic acid is painful, even when cocaine is added; after the application the part should be energetically massaged, to prevent the formation of hard scars; 0.10 to 0.15 gramme ( $1\frac{3}{4}$  to  $2\frac{1}{4}$  grains) of the 10-per-cent. solution may be safely applied in hypodermatic form (parenchymatously in struma). A syringe used for injecting morphine should not be employed, since even the smallest traces of morphine immediately separate the iodine from the iodic-acid solution. The internal use

of iodic acid is indicated in gastric hæmorrhage and in violent vomiting.

*Iodides.*—A writer <sup>1</sup><sub>Sept. 1, '94</sub> remarks that potassium iodide is better borne if it is given immediately before eating, but that it may be administered during or after a meal to avoid its coming in contact with the mucous membrane of the stomach and so being absorbed too rapidly. The following solution, said to be preferred by Fournier, contains 15 grains (1 gramme) of the iodide to the tablespoonful: Syrup, 350 parts; Bordeaux anisette, 150 parts; potassium iodide, 25 parts. Neisser <sup>116</sup><sub>No. 5, '94</sub> claims that the new product—iodide of rubidium—is better tolerated than iodide of potassium. Leistikoff <sup>28</sup><sub>No. 10, '93</sub> also prefers it in syphilis. Vogt <sup>35</sup><sub>May 19, '94</sub> had seen it well borne by three patients who could not tolerate iodide of potassium. One of his patients had not observed the primary symptoms of pharyngitis and acne pustules appear until after six days of the treatment, while with potassium iodide the effects showed themselves on the second day. In a case of syphilitic brain trouble he had been able to control the symptoms in four days, without the patient complaining of the annoying effects which in her case had followed the administration of potassium iodide. It is, in his opinion, applicable in cases where a prolonged treatment with iodine in small doses could not be instituted on account of the individual susceptibility of the patient.

*Iodine.*—Cadier and L. Jolly <sup>24</sup><sub>June 17, '94</sub>, <sup>80</sup><sub>Nov.</sub> report their further experience in the treatment of tuberculosis by metallic iodine associated with the phosphate of iron and the glycerophosphate of potassium. The first combination was given in wine, each spoonful of which contained 0.10 gramme ( $1\frac{3}{4}$  grains) of glycerophosphate of potassium and 0.025 gramme ( $\frac{2}{5}$  grain) of iodine. The second combination was administered in the form of pills, each one of which contained 0.025 gramme ( $\frac{2}{5}$  grain) of iodine and 0.004 gramme ( $\frac{1}{16}$  grain) of iron phosphate. The first week only 2 spoonfuls of the wine were allowed, and during the second week 2 spoonfuls of wine and 2 of the pills, to make up 4 spoonfuls of wine and 12 pills a day, representing in all 0.40 gramme (6 grains) each of iodine and glycerophosphate of potassium and 0.05 gramme ( $\frac{7}{8}$  grain) of iron phosphate. These quantities never cause noxious effects, not even in patients who had previously suffered from hæmorrhage. The number of cases



observed was twenty-six during a period of from three months to two and a half years. During the first months there occurred an appreciable amelioration of the local lesions in the larynx as well as in the lungs. In from five to six weeks of treatment the appetite was considerably increased and the patients felt stronger. After from four to five months the amelioration of the local lesions was rapid and marked and the weight of the patients increased. During a period of from ten months to two and a half years there was a progressive and simultaneous amelioration of the local lesions and the general condition of the patient. The râles diminished gradually and the general health was much improved. Three of the patients resumed their usual work, and, notwithstanding the inevitable attack of grippe of that winter, no new untoward phenomena were observed on either larynx or lungs.

*Iodoform.*—A. Foxwell<sup>32</sup><sub>July, '94</sub> has had considerable experience of the value of iodoform in the treatment of tuberculous phthisis during the last eight years, and, on the whole, he considers it the most satisfactory of all the antiseptic drugs which have been used in tuberculosis. The usual prescription was 1-grain (0.065 gramme) pill, to be taken six times a day. The dose never exceeded that amount and was occasionally less, the average being 5 grains (0.32 gramme) daily. In three cases only were any symptoms of poisoning detected, and these were merely of a mild gastric nature. The author also tried the drug in conjunction with oil and tonics, but after a three years' trial concluded that iodoform given by itself gave better results than any other drug or combination of drugs that he had tried or seen tried. It soothed the nervous system of erethic subjects; it very greatly lessened cough and expectoration; it powerfully increased nutrition, the patients often becoming quite plump under its continued use; finally, there was as great, if not greater, improvement in the physical signs than by any other mode of treatment except that of climate and hygiene. Foxwell has since used iodoform for the cure of phthisis in some private patients and in some hospital in-patients, and his later experience fully bears out his previous impressions. As regards mode of administration, the author believes it to be always safe to begin with 2 grains three times a day. If the patient have difficulty in steadily taking this small dose it is useless to persevere any further with the drug.

Beck <sup>July 21, '94</sup> tried injections of iodoform in twelve cases of hæmorrhoids, obtaining such good results that he calls the attention of the profession to his method, which is as follows: After having prepared the patient by cleansing the bowels thoroughly with repeated irrigations of a solution of salicylic acid about fifteen minutes before the operation, a suppository containing 2 grains (0.13 gramme) of cocaine and from  $\frac{1}{4}$  to  $\frac{1}{3}$  grain (0.016 to 0.02 gramme) of morphine is introduced into the rectum. If the patient is extremely sensitive at the beginning of the operation a 1-per-cent. solution of cocaine should be injected into different portions of the mucous membrane, but practically he has never found this to be necessary. It may predispose the patient to hæmorrhage. After the introduction of an iodoform-gauze tampon through a small speculum the tumors are brought into view without grasping them with a forceps. Two drops of a saturated solution of iodoform in ether are then injected into the cellular tissue adjoining each nodule. Injecting this on both sides of the latter causes a formation of scar-tissue and a shrinkage of the circum-venous tissue. If the cocaine-morphine suppository have been introduced at the proper time, the pain following this procedure is very slight and passes away in a few moments. In place of the gauze tampon a suppository containing 2 grains (0.13 gramme) of salicylic acid is now substituted, and bismuth and opium are given to prevent a movement of the bowels. On the third day 2 ounces (62 cubic centimetres) of olive-oil are injected into the rectum, and castor-oil is given *per os*. During the subsequent weeks great care should be taken to keep the bowels loose. This operation does not prevent the patient from attending to his daily work.

P. Chéron, of Paris, <sup>164</sup><sub>July 12, '94</sub> publishes a complete study of the accidents due to iodoform. The local symptoms are generally insignificant erythematous erosions, erysipelas, or simulated phlegmon, especially affecting the finer portions of the skin, as the face, eyelids, scrotum, etc. The conjunctiva, however, appears to be tolerant of the drug, and the eruptions are rarely observed in children. The local lesions are almost always due to the use of the powder and gauze. General symptoms may occur without any preceding local symptoms, the point of entrance being the stomach, lungs, or skin. Injections of iodoform ether are rarely followed by accidents, while certain wounds predispose to them,

especially those involving fatty tissue, as in operations on the breast and bones. General symptoms are also frequently observed in cases of fistula and ulcers, in which the iodoform remains for a long time. The clinical signs are a sudden rise of temperature ( $39^{\circ}$  to  $40^{\circ}$  C.— $102.2^{\circ}$  to  $104^{\circ}$  F.) and the appearance, on the same day or the following day, of an eruption, often of the scarlatiniform or erythematous type. Internal symptoms may exist at the same time or alone, such as dislike for food, burning sensation in the epigastrium, vomiting, and nausea. All these phenomena may be sufficiently severe to cause death, especially in elderly persons in whom there is renal insufficiency. J. K. Das<sup>239</sup><sub>June 16, '94</sub> reports a case of iodism consecutive to the external use of iodoform in a boy with a large ulceration in the parotid region following an abscess which had opened spontaneously. Coryza, redness of the conjunctiva, frontal headache, and a metallic taste in the mouth disappeared in two days after the iodoform dressing was discontinued. Th. Oldenburg, of Copenhagen,<sup>373</sup><sub>No. 18, '94</sub> relates the case of a woman, aged 51 years, who for the last twenty years had been subject to epileptic fits without exhibiting any signs of disturbance of the mind. After having been treated for twelve days with a 10-per-cent.-strong iodoform ointment for a burn of the hand she exhibited symptoms of acute derangement of the mind, with hallucinations, lasting for about one month. During the first days there was a strong reaction of iodoform in the urine, which also contained small quantities of albumin. Both disappeared a few days later.

Di-iodoform is the name given by Maquenne and Taine to a new antiseptic which is proposed as a substitute for iodoform.<sup>3</sup><sub>No. 66, '93</sub>; <sup>9</sup><sub>Jan. 6, '94</sub> Chemically it is ethylene-periodate and consists of carbon, 4.62 parts; and iodine, 95.38 parts. It is insoluble in water, slightly soluble in alcohol and ether, but dissolves readily in chloroform, carbon disulphide, benzin, and hot toluene. It crystallizes in beautiful needles quite distinct from the hexagonal plates of iodoform. If kept in the dark it remains practically odorless. The compound is an exceedingly-stable one. It is prepared by treating acetylene-periodate with iodine in excess. Hallopeau and Brodier<sup>296</sup><sub>Feb. 8, '94</sub> report thirteen cases of simple chancre treated by di-iodoform, finding that its application caused no pain or irritation. The authors state that it may be employed in the

same manner as iodoform in the treatment of simple chancre, and, like iodoform, it usually brings about recovery in eighteen to twenty days. It may fail, as does iodoform, in cases of phagedenic chancre. It should be applied several times daily, and absorbent cotton impregnated with it should be kept upon the ulcerated parts. They used it successfully in a case of lymphangitic abscess of the penis, and hence believe that it may be tried in all cases of suppuration amenable to iodoform. Regnauld and Vigier<sup>296</sup><sub>Apr. 8, '94</sub> tried it in several surgical operations, finding it preferable to iodoform.

*Iodophenin*.—This remedy contains two molecules of phenacetin with three molecules of iodine (51.5 per cent.). Schüller has employed it<sup>113</sup><sub>Jan. 14, '94</sub> in the treatment of purulent and infectious wounds and found that it equals corrosive sublimate and iodoform; however, since iodine is so easily liberated, the direct application of iodophenin is contra-indicated in fresh wounds. Ichorous ulcers of the leg became dry and aseptic after the second dressing of iodophenin in powder or glycerinated emulsion on cotton, and iodoform then accomplished a prompt cure. Iodophenin proved also very efficient against anthrax. As it exerts a slightly-caustic action on the granulations, after the wounds have become clean under its use it should be replaced by iodoform. Iodophenin is also serviceable after the extirpation of ganglia as well as after major surgical operations (resections, etc.) to prevent decomposition of secretions in contact with bandages. It is preferable not to sprinkle the wounds directly, but to use it between the layers of the cotton dressing, which may be left in place for two to three weeks without becoming putrid, even in cases of very abundant secretion from non-aseptic wounds.

*Iron*.—Hayem<sup>113</sup><sub>p. 508, '94</sub>; <sup>814</sup><sub>May 1</sub> has used iron oxalate for years in the treatment of chlorosis, and prefers it to all other inorganic iron preparations. He first gives 2 pills, each of 0.10 gramme ( $1\frac{3}{4}$  grains) daily, during meals, and afterward increases the dose to 0.30 to 0.40 gramme ( $4\frac{1}{2}$  to 6 grains), if the patients bear the remedy well. He has given as much as 0.60 gramme ( $9\frac{1}{4}$  grains) a day uninterruptedly for a long time, without ever observing any disturbance of digestion, it is reported. The results of an exact determination of the hæmoglobin and of the counting of the blood-corpuscles, after the administration of ferrous oxalate, speak well for the remedy.



Feige,<sup>116</sup><sub>July, '94</sub> following Rehn, recommends applications of pure perchloride of iron in pharyngeal diphtheria, regarding it as an unfailing specific. The suffering which the applications cause is most intense, but three or four are sufficient to vanquish the disease. Of thirty-six cases treated by the author there was but one death,—from enormous ganglionic tumefaction.

Ferratin is the name given by Schmiedeberg,<sup>273</sup><sub>B.23, II.2,3; Apr.2, '94</sub> of Strasburg, to that combination of iron which is found in the normal tissues and which is stored up in the latter as a reserve from which it may be drawn for the formation of blood. He has succeeded in producing this substance, by artificial means, in the form of a fine powder of red-brown color, like oxide of iron. Two forms are known to commerce,—the one simple and insoluble in water, the other a sodium compound which readily dissolves on stirring after being allowed to stand a little while in water. The latter must be as free as possible from lime, otherwise an insoluble calcium compound is formed. Ferratin, in contradistinction to those compounds of iron hitherto in use, is readily assimilated and does not produce any unpleasant disturbances in either the gastric or enteric functions, even when used for a lengthy period; indeed, in some cases its exhibition seems to produce improvement in the appetite and regularity in defecation. As a portion of the substance is decomposed by the acid gastric juice and also by sulphuretted hydrogen, a sufficient quantity of ferratin must be ingested to leave an overplus in the bowel-tract so that the organism may pick up as much as it requires. There is no necessity whatever to anticipate overloading of the organism with the iron, as absorption and excretion appear to be mutually controlling. Excretion does not take place through the kidneys. The daily dose for adults is 1 to 1.5 grammes ( $15\frac{1}{2}$  to  $23\frac{1}{4}$  grains). Acids should be avoided, but no other restrictions are necessary. Schmiedeberg points out that ferratin is first and foremost a food, and its use is indicated in all cases in which nutrition and blood-formation are unsatisfactory.

Banholzer, of Eichhorst's clinic,<sup>319</sup><sub>Jan. 27, '94; Feb. 17, '94</sub> relates his clinical investigations with this preparation. In anæmia following acute disease the hæmoglobin was quickly increased (over 5 per cent. in eight days), as also the number of red cells. In chlorosis the same results were visible even in a more marked degree. The general condition was improved and the increase in weight in most cases

considerable. The good effects on the appetite were obvious. When compared with Blaud's pills, which also give good results, ferratin was found to lead to a greater increase in the hæmoglobin. John Harold <sup>15</sup><sub>Aug., '94</sub> found that in three cases of severe anæmia the preparation appeared to exert a remarkable hæmatinic effect; it did not interfere with digestion or produce any constitutional disturbance. In one of the patients, iron, in the form of a scale-preparation or as reduced iron, had been given previously for twelve months without apparent benefit.

Germain Sée <sup>1153</sup><sub>Aug. 25, '94</sub> has also tested ferratin, and finds that it can be employed in men apparently healthy or in children and chlorotic subjects, the curative action not being interfered with by injurious secondary effects, as is often the case when ordinary ferruginous preparations are used. The dose used by him is from 0.05 to 1.5 grammes ( $\frac{7}{8}$  to  $23\frac{1}{4}$  grains) two or three times a day. Each dose contains about 7 per cent. of iron. Marfori <sup>477</sup><sub>Feb. 1, '94</sub> states that care should be taken not to associate it too closely with acid materials. Hugo Wiener <sup>88</sup><sub>Apr. 13, '94</sub> reports twenty cases in which it produced favorable results.

*Jurubeba*.—A. Michaelis <sup>116</sup><sub>Aug., '94</sub> calls attention to the effect as a stomachic of jurubeba-extract, obtained from the root of *Solanum paniculatum*. It acts well in the dyspepsia of patients suffering from biliary lithiasis or other affections of the liver. It may be prescribed either in fluid extract, beginning with doses of 1 gramme ( $15\frac{1}{2}$  grains) and increasing to 3 grammes (46 grains) three times a day, or in pills. The drug causes improvement in appetite, relief of pain, diminution of tumefaction in the biliary vesicle, and cessation of attacks of biliary colic. It has no influence on diuresis or constipation, and the author observed no change in the color of the urine or fæces; so that it probably has no effect as a cholagogue.

*Lactophenin*.—This substance is allied to phenacetin both chemically and therapeutically. It is a crystalline powder with a somewhat bitter taste and is very slightly soluble in water. According to Landowski, who tried it in Proust's clinic, <sup>6</sup><sub>Apr. 21, '94</sub> it acts precisely like phenacetin when both are given in 0.60-gramme ( $9\frac{1}{4}$  grains) doses, but 1 gramme ( $15\frac{1}{2}$  grains) of lactophenin produces a decidedly-hypnotic effect. Von Jaksch, <sup>319</sup><sub>No. 14, '94</sub> who employed it in doses of from  $\frac{1}{2}$  to 1 gramme ( $7\frac{3}{4}$  to  $15\frac{1}{2}$  grains) in typhoid fever,

found that it always rapidly reduced the temperature, and also that it exercised a calming effect when there was restlessness or delirium. Jaquet, of Basel, <sup>214</sup><sub>May, '94</sub> employed it in pneumonia, erysipelas, and influenza, and found that it nearly always reduced the temperature rapidly and for some considerable time without any serious symptoms being produced; especially there was never any weakness of the heart's action or of respiration, nor any dyspnoea or collapse observed, and the pulse, as a rule, became fuller and slower, while the breathing remained unaffected. The great advantage of this drug appeared to be its calming hypnotic effect, together with its reduction of the fever. The hypnotic value of lactophenin Jaquet estimates as intermediate between that of sulphonal and that of urethan. The usual doses employed by him were from 0.5 to 0.7 gramme ( $7\frac{3}{4}$  to  $10\frac{3}{4}$  grains). H. Strauss <sup>116</sup><sub>Sept., '94</sub> tried the drug as an antipyretic in twenty-five cases, finding it preferable to any other on account of its harmless nature. In typhoid fever it seemed to have a special calmative effect on the nervous system. Roth <sup>8</sup><sub>Sept. 13, '94</sub> used it in several cases of acute rheumatism, finding it equal to the salicylates. The pain and swelling disappeared within twenty-four to forty-eight hours, the temperature continued low, and no unpleasant effects were observed, though large doses were given.

*Lawsonia Inermis*.—Ehrmann <sup>243</sup><sub>Apr., '94</sub>; <sup>1</sup><sub>May 12</sub> publishes a study of this plant, the *hanneh* of the Arabs, who look upon it as a panacea, and briefly enumerates the uses of the plant in Arabic medicine. Fissures are treated with a mixture of powdered lawsonia and powdered alum. Chancres and other ulcerations are covered with the powdered plant, and the itch is treated in the same way. The drug is employed topically as a remedy for engorgement of the lower limbs complicated with ulceration. As an application to wounds it is considered tonic and astringent. Wounds with great loss of substance are treated by means of quantities of the plant, and the dressing is renewed once in three days. Contused wounds are treated with the leaves beaten and moistened with a little water. Migraine is treated with poultices containing the seeds and black anise. Diarrhoea is cured with a weak decoction of the plant. The flowers, in infusion, are remedial in migraine and bruises; a perfumed oil prepared from them is used as a cosmetic. An Arabian remedy for sterility con-

sists in smelling of the fresh flowers. A few leaves of the plant cast into a cup of boiling water form a drink which is believed to ward off all the unpleasant consequences of abortion. The bark, in decoction, is used for jaundice, inflammation of the liver, calculous affections, leprosy, and diseases of the spinal cord. The fruit is considered emmenagogue.

*Lead.*—Paessler<sup>34</sup><sub>No. 5, '94</sub> reports a case of acute lead poisoning following the use of diachylon plaster. The patient was a child of 21 months, with generalized eczema. The urine was normal. Bands of linen covered with a layer of diachylon ointment as thick as an ordinary knife-blade were placed on the limbs, and renewed two days later, when the eczema was seen to be much improved. The following day the child was apathetic, the limbs were œdematous, and he had passed but a few drops of urine since the previous evening. The dressing was removed and a hot bath given in order to remove any traces of the ointment. The following day the urine (60 cubic centimetres—1 $\frac{3}{4}$  fluidounces—in twenty-four hours) contained a notable quantity of albumin, blood, red and white globules, and granular casts. There was tumefaction and hyperæmia of the buccal mucous membrane, and an abundant flow of saliva. In two months the symptoms had entirely disappeared.

*Legumin.*—See Alimentation.

*Lime.*—See Calcium.

*Loretin.*—A. Claus<sup>69</sup><sub>No. 33, '94</sub> states that loretin has for some time past been substituted for iodoform at Schinzinger's clinic at Berlin. The results have been most satisfactory and there has been a complete absence of accidents. In three cases as much as 300 or 400 grammes (9 $\frac{1}{2}$  to 12 $\frac{3}{4}$  ounces) were used without causing any symptoms of poisoning. Schinzinger himself<sup>283</sup><sub>No. 47, '93; Dec. 2</sub> states that the chemical name is "meta-iod-ortho-oxy-chinolin-ana-sulphon-acid." It is an iodine preparation, at the same time possessing the properties of a phenol and the important characteristic attributes of a chinolin derivative. Physically it is a yellowish powder, consisting of minute crystals and resembling iodoform, but having no odor and only slightly soluble in water or alcohol, and forming useful emulsions with oil, collodion, etc. As a powder it is very serviceable when somewhat diluted, and with metals it forms valuable salts,—the calcium salt, for instance,—being insoluble in



water and a very suitable substance with which to impregnate gauze. Blum and Bärwald<sup>34</sup><sub>Sept. 4, '94</sub> attribute its antiseptic action to the gradual separation of iodine, which in the nascent state has considerable antiseptic action. Loretin forms salts with metals, and in these new bodies this property of the separation of nascent hydrogen is in some cases retained. This holds good with bismuth loretin, which possesses also the astringent properties of bismuth. Fenzling, of Metz,<sup>116</sup><sub>Feb., '94</sub> reports several cases in which he used loretin to good effect.

*Lycetol.*—This is the tartrate of dimethyl-piperazine. According to Wittzack,<sup>297</sup><sub>No. 7, '94</sub> if the theory be correct that in gout in general there is no increased formation of uric acid, but that the blood of gouty persons is only faintly alkaline and therefore less capable of holding uric acid or its salts in solution, the administration of this tartrate of a piperazine derivative must produce the combined effects of its components. Lycetol also possesses the great advantages of having an agreeable taste and of being non-hygroscopical. Its aqueous solution has an agreeable acid taste, and if sugar be added it is cooling like lemonade, and does not excite repugnance when administered for a long time.

*Lysidin.*—This substance, ethyl-enethenyl-diamin, is readily soluble in water and has been recommended by Ladenburg as being non-toxic and five times superior to piperazine in dissolving urates. E. Grawitz<sup>69</sup><sub>No. 41, '94</sub> tried it in acute and chronic gout, administering it in daily progressive doses of 1 to 5 grammes ( $\frac{1}{4}$  to  $1\frac{1}{4}$  drachms) in 500 grammes (1 pint) of gaseous water. Even concentrated solutions (1 to 100) were taken without repugnance, especially when iced. No untoward symptoms of any sort were observed, and no dislike for the medicine was expressed, even after continued use. Lysidin proved to be a powerful remedy for gout, the pain ceasing soon after its use was begun, the joints becoming supple and the tophi diminishing. The general condition was in no way impaired, the body-weight increasing and the appetite remaining good. The author believes it to be the best remedy so far proposed for the disease. It failed entirely, however, in a case of polyarticular rheumatism, in which antipyrin soon proved successful.

*Lysol.*—N. K. Rudneff<sup>530</sup><sub>No. 20, '93</sub> obtained very good results in sixteen recent cases of dysentery by the use of lysol enemata. A

1-per-cent. aqueous solution was always used, 1 pint being injected three times daily until the disappearance of blood from the stools. This occurred in 11 cases on the second day, in 3 on the fourth, and in the remainder on the sixth and eighth. A marked general improvement (including the subsidence of abdominal pain) invariably commenced on the second or third day, all the patients making a rapid and permanent recovery. Rossa<sup>8</sup><sub>No.24,'03</sub> finds that lysol is an antiseptic agent of great power, and with water, in the strength of 1 per cent. and upward, forms a milky fluid of a tar-like odor. It will not, except in very strong solutions, affect the hands, like carbolic acid or sublimate solution, the latter, as is known, often producing severe eczema. It is also freely soluble in water, in which it has the advantage of carbolic acid; in its solubility the danger of toxic effects is decreased. In solutions of the strength of 1 per cent. it forms a valuable disinfectant for instruments, the external genitals, and the hands, on the latter producing much the same soap-like feeling that creolin does. For vaginal injections he generally uses it in the strength of 2 per cent. Under the strength of 1 per cent. it quickly becomes useless as a disinfecting agent. Rubber drainage-tubes and catheters should not be left too long in solutions of lysol, as they become roughened by contact with it. In gynæcological practice the results of its use have been good; but in applications within the bladder, even in as weak a solution as  $\frac{1}{2}$  of 1 per cent., it has produced cystitis. Maas<sup>326</sup><sub>B 52,H.6,0</sub> believes it to be of value where a direct disinfectant is needed for the mucous membranes. He has used it as a gargle—5 parts to 100—in angina, and in a 1-per-cent. solution as a nasal wash.

*Magnesium.*—Fincke<sup>9</sup><sub>Aug.25,'94</sub> has made some experiments to test the purgative properties of magnesium sulphate when hypodermatically administered. Rohé and Wade<sup>19</sup><sub>Jan.27,'94</sub> reported that they had employed the drug in this manner in 46 cases, with the following results: The number of injections made was 100. In 67 per cent. the injection was successful, in 33 per cent. it failed. The dose varied from 1.86 to 4.5 grains (0.12 to 0.30 gramme). It was found that small doses acted as efficiently as slightly-larger doses. In only 1 case was the dose of 4.5 grains employed. The shortest time for the injection to produce an evacuation was three hours, the longest fourteen. Fincke's results have not been so

satisfactory: 25 cases were selected, and 50 injections of from 1 to 6 grains (0.065 to 0.40 gramme) were made. The average dose was 2.78 grains (0.175 gramme). In the majority of cases the results were negative. In order to compare with the foregoing the action of magnesium sulphate given in the usual doses by the mouth, 11 cases were selected, and in these, with one exception, the results were negative with hypodermatic administration. The results obtained in all cases by the two methods of administration were as follow: Hypodermatically,—success, 18 per cent.; failure, 82 per cent. By the mouth,—success, 72.7 per cent.; failure, 27.3 per cent. While the author does not consider the number of hypodermatic injections as conclusive, he still believes that the foregoing results cast considerable doubt upon the purgative property of magnesium sulphate exhibited hypodermatically in small doses.

*Malakin.*—Jacquet <sup>214</sup> <sub>No. 18, '94</sub>; <sup>15</sup> <sub>July, '94</sub> has made numerous experiments with malakin, a substance resembling phenacetin and formed by a combination of salicylic aldehyde and paraphenetidin. It is insoluble in water, and, when administered to rabbits in doses of 1 to 2 grammes (15½ to 31 grains), appeared to produce no effect, though its absorption was proved by the subsequent presence of salicylic acid in the urine. Fourteen cases of acute rheumatism were treated with daily doses of 4 to 6 grammes (1 to 1½ drachms). The pains and fever subsided on the second or third day, under circumstances suggestive of the action of salicylic acid, but without any of its unpleasant after-effects. As an antipyretic it was employed in forty-eight febrile affections. A reduction of temperature took place from the second to the fourth hour after administration, the first two hours probably being required for the reduction of the drug by the gastric juice and the subsequent absorption of its active elements. As an energetic antipyretic, however, it cannot compare with antipyrin; and the author considers that the two remedies are respectively useful in different groups of cases, malakin being especially beneficial in typhoid fever, tuberculosis, etc., where other antipyretics cannot with safety be administered. The slowness and evenness of its antipyretic action make it especially valuable in the case of children and weakly patients. It may be given for a long time in cases of neuralgia and habitual headache without injury. Oscar von

Bauer, who had tried in Drasche's wards in Berlin, <sup>658</sup><sub>Nov. 11, 12, '94</sub> agrees as to its mild and gentle action and also as to its efficacy in acute rheumatism and as an antipyretic. F. Merkel <sup>34</sup><sub>Apr. 24, '94</sub> had satisfactory results in fifteen cases of rheumatism, two of enteric fever, and one of neuralgic pains in typhlitis. Germani <sup>505</sup><sub>July 24, '94</sub> concludes, from his experience, that malakin is a useful antirheumatic remedy and an excellent substitute for the salicyl compounds, being unattended by the disadvantages of the latter preparations.

*Massage.*—J. K. Mitchell <sup>5</sup><sub>May, '94</sub> describes the effect of massage on the number and hæmoglobin value of the red blood-corpuscles. He examined the blood of thirty individuals before and after massage. The massage was mostly continued for at least an hour; and, if general massage is to be of service, he thinks it must be of a full hour's duration. Of the thirty persons whose blood was examined once or on several occasions two were healthy, while the rest suffered from various forms of anæmia, malnutrition, nervous complaints, etc. A considerable increase in the number of red blood-corpuscles was nearly always observed after massage, but the hæmoglobin was not usually increased to a corresponding extent. Considering that red blood-corpuscles could not be formed so rapidly and in numbers sufficient to account for the increase observed after the massage, Mitchell suggests that the massage may have the effect of bringing a number of red blood-corpuscles into the circulation which, before the massage, had been resting in various parts of the body. It is further suggested that these additional blood-corpuscles, brought into the circulation by the massage, may be of a different quality from the others, and poorer in hæmoglobin, and that this may explain why the hæmoglobin is usually not increased after massage to an extent corresponding to that of the increase in the number of corpuscles. This latter increase was observed to be independent of the nature of the disease from which the patient was suffering. Mitchell thinks that massage may be employed without danger in high grades of anæmia. The greatest increase in the number of corpuscles is observed about an hour after cessation of the massage.

*Menthol.*—Having noted the favorable results obtained in 1888 by Braddon in the treatment of pulmonary tuberculosis by means of peppermint, L. M. Carasso <sup>8</sup><sub>Mar. 16, '94</sub> proposes the following treatment of the disease, at any stage of its evolution: The



patients are made to inhale continually essence of peppermint and are given internally a solution of creasote with glycerin, chloroform, and 1-per-cent. essence of peppermint. The author obtained excellent results by this method in thirty-nine cases of phthisis, with extensive cavities. The cough diminished, as did also the expectoration, from which the bacilli of Koch were seen gradually to disappear. The night-sweats disappeared and the appetite and body-weight increased. F. Kastorsky <sup>586</sup><sub>No.24,'94</sub> <sup>2</sup><sub>Oct.20</sub> reports 37 cases of diphtheria (in 3 adults and 34 children) treated and cured by painting with a 10-per-cent. alcoholic solution of menthol. The paintings (by means of a piece of cotton-wool) were usually carried out three times daily. In some cases, however, a single free application was followed by complete disappearance of false membranes within two days. A marked improvement in the patients' general condition was invariably noticed from the beginning of the treatment. The same simple method was successfully practiced by the author in numerous cases of anginas of various forms, and by Trütovsky in a group of cases of scarlatinal diphtheria. The paintings are said to be painless and quite harmless.

*Mercury.*—Welander <sup>370</sup><sub>V.56,No.2; Apr., '94</sub> <sup>673</sup> has had the opportunity of observing ninety-seven cases of syphilis before treatment with mercury and during the administration of the drug. He found that its elimination was accompanied by a greater or less irritation of the kidneys, manifested by casts in the urine. These casts increase in proportion to the length of the treatment, gradually decrease after its cessation, and generally disappear within a month or six weeks. No injury to the kidneys, either temporary or permanent, was observed. He holds that when inunctions are used a large amount of ointment should be employed, so that a part can be absorbed during the rubbing and the remainder can be left on the skin under a bandage. He recommends that, in place of rubbing, ointment should be simply smeared on the surface in the evening; after this the patient should be kept in bed from ten to fourteen hours in a warm room.

An interesting discussion on the therapeutic value of subcutaneous injections of mercury in syphilis took place before the French Society of Dermatology and Syphilography. <sup>2100</sup><sub>'94</sub> A number of syphilographers took part in the debate, among them being Augagneur, Thibierge, Jullien, Balzer, Cordier, du Castel, Brocq,

Barthélemy, etc, of France, and Stoukowenkoff and Hakawenkoff, of Russia. From their arguments the following conclusions may be drawn: 1. It is erroneous to believe, as was at first believed, that mercurial injections, no matter how made, will jugulate the course of syphilis in a short time. 2. Mercurial injections, when methodically and aseptically practiced, are without serious danger, but are painful and badly borne by the patients. 3. They possess the advantage over internal mercurial medication of not causing mercurial poisoning. 4. They should, however, be resorted to only in cases where rapid intervention is necessary, when internal administration is slow in producing the desired results, or when, on account of the peculiar severity of the symptoms, intense impregnation with mercury is desirable.

Bichloride of mercury has been employed for the past three years by Roudneff<sup>530</sup><sub>No. 20, '93</sub> in dysentery. A solution of 1 in 6000, or 0.03 gramme to 180 grammes ( $\frac{1}{2}$  grain to 6 ounces) of water, was given by rectal injection. Of seventy-five cases recently treated there were but three deaths, all the others being completely cured. G. Paufli<sup>727</sup><sub>v. 3, '93</sub> has studied the influence of acids and of chloride of sodium on the antiseptic power of sublimate solutions, finding that sulphuric acid increased that power to the greatest extent, hydrochloric acid being next and tartaric acid being the least effective. Common salt also increased the bactericidal action of the sublimate, but to a lesser degree than the acids.

Baccelli<sup>2022 80</sup><sub>'94; June</sub> refers to the success obtained by him, in the treatment of malaria by intra-venous injections of neutral salts of quinine, in 1888. Since then he has been experimenting with intra-venous injections of corrosive sublimate in syphilis, with such success that the method is now employed by many Italian physicians. The solution Baccelli employs is as follows: Hydrarg. bichlor., 1 part; sodii chlor., 3 parts; aq. dest., 1000 parts. The skin is cleansed and rendered aseptic, and a syringe of the solution is injected into a vein at the elbow, back of the hand, or thigh. The veins are first made prominent by constriction. The injection must be into the lumen of the vein, otherwise pain and swelling will result. In a few minutes (five to six) mercury is excreted in the saliva. The "cure" begins with the injection of 0.001 gramme ( $\frac{1}{64}$  grain) of corrosive sublimate daily,—that is to say, 1 cubic centimetre (15½ minims) of the solution (1 to 1000);

then the quantity is increased from 0.002 to 0.008 gramme ( $\frac{1}{32}$  to  $\frac{1}{8}$  grain),—the maximum dose. For 0.004 gramme ( $\frac{1}{16}$  grain) a 2-per-cent. sublimate solution may be employed, so as to avoid the injection of too large a quantity of fluid. In exceptional cases he begins the treatment with doses of 0.004 to 0.005 gramme ( $\frac{1}{16}$  to  $\frac{1}{12}$  grain). Baccelli calls special attention to the following points: 1. The small quantity required. 2. The possibility of overcoming many symptoms quickly,—symptoms which indicate direct blood-poisoning with the syphilitic virus. 3. The benefit and widely-distributed action upon vessel-walls which are the specially-favored seat of syphilitic alterations.

Baccelli also employs sublimate injections for the cure of echinococcus cysts. The cyst is punctured and about 30 cubic centimetres (1 ounce) of the fluid drawn through a trocar; 20 cubic centimetres (5 fluidrachms) of 1 to 1000 sublimate solution are then injected, the trocar withdrawn, and a dressing applied. In five days the patient is dismissed cured. The parasite is killed and the subjective and objective symptoms subside by degrees.

Th. Kézmárszky <sup>622</sup> <sup>19</sup> <sub>No. 24, '94; Oct. 13</sub> has employed intra-venous injections of corrosive sublimate in two cases of puerperal sepsis. The first patient received, in 10 injections, 0.037 gramme ( $\frac{5}{8}$  grain) of the drug; the second 8 injections and 0.031 gramme ( $\frac{1}{2}$  grain). In both cases the general condition improved, the fever decreased, and recovery followed. In a case of very severe puerperal fever no result was obtained with 17 injections, for after thirty to forty rigors it terminated fatally.

Calomel has been used by Raubitschek <sup>116</sup> <sup>2</sup> <sub>Apr. 18, '94; Oct. 15</sub> in the treatment of whooping-cough. He thoroughly saturated a cotton-wool tampon with a 0.1-per-cent. solution of bichloride of mercury, introduced it into the mouth, pressed it against the base of the tongue, thus allowing the fluid to trickle downward over the epiglottis, and finally withdrew it, at the same time swabbing the tonsils, uvula, and soft palate. This procedure was carried out daily, or every other day, according to the severity of the case, and was attended with the best results in seventeen cases. An improvement was noticeable on the second or third day, and all the patients were either cured or relieved within eight or fourteen days. One case appeared to be arrested during development by

five applications of the solution. The author considers any poisonous effects to be impossible. Moizard <sup>296 80</sup><sub>Aug. 24, '94; Nov.</sub> gives an account of his experience in the treatment of diphtheria by the local applications of corrosive sublimate in glycerin solutions of a strength varying from 1 in 20 to 1 in 30 or 1 in 40. The first solution is preferred for children over 2 years old, and the other two solutions for those below this age. The applications are made twice or three times a day by means of a brush, care being taken to prevent the remedy from being swallowed. The results are said to be most satisfactory. The treatment is continued for several days after the disappearance of the false membranes. In one hundred and twelve cases treated the author obtained a complete cure in 80 per cent., and refers to other practitioners giving a higher percentage with the same method. He asserts that solutions indicated produce no caustic effects.

Skliowski <sup>326</sup><sub>B. 52, H. 3, 4</sub> affirms, contrary to the views of Jendrassik and Rosenheim, that as a diuretic calomel acts in renal disease better than in cardiac troubles. In seven out of fourteen cases of well-defined Bright's disease, accompanied with œdema, it was found superior to all other diuretics. V. Schultz <sup>4</sup><sub>No. 6, '94</sub> believes calomel to have no influence upon a markedly-increased biliary excretion; but, in gall-stones and diseases of the biliary passages, it acts not by increasing the biliary excretion, but by its disinfecting properties, thus diminishing the abnormal irritation of the mucous membrane of the gall-bladder. Watraszewski <sup>569 673</sup><sub>No. 14, '93; Apr., '94</sub> recommends calomel soap for inunctions in the treatment of syphilis, prepared as follows: Calomel in the form of a vapor is mixed with a potash soap in strength of 1 to 2 or 1 to 3, which forms a soft mass of a white color. From 2 to 3 grammes (31 to 46 grains) of the soap should be used every day. The parts to be rubbed should be washed with ordinary soap and water, and, the patient having taken a bath, the soap should be rubbed in with a rotary motion of the hand for from ten to fifteen minutes. The advantages of this method are: (1) its application requires but little time; (2) the soap is odorless and colorless and does not soil the linen; (3) the inunctions do not irritate the skin except when applied too often in the same region; (4) cure rapidly results.

Gallate of mercury is a greenish-brown powder containing about 37.17 per cent. of metallic mercury. L. J. Cheïnisse <sup>586</sup><sub>No. 14, '94</sub> used



it in forty-seven cases, in the form of pills, each containing 0.05 gramme ( $\frac{7}{8}$  grain) of gallate of mercury and 0.10 gramme ( $1\frac{3}{4}$  grains) of extract of quinquina. One of these was given at each of the two principal meals daily, or, if the teeth were very bad, only 1 was given. It was only in rare instances that 4 pills daily were required. The mouth was carefully washed out after each meal by a 1 to 50 solution of potassium chlorate, and, if there were any fear of infection, the teeth were cleaned with a powder consisting of charcoal, quinquina, and menthol. The drug was rapidly absorbed, mercury being found in the urine on the second day after its administration.

The double hyposulphite of mercury and potassium presents itself in the form of colorless crystals, easily soluble in water, and producing no precipitate in solutions of albumin, and contains 31.4 to 100 per cent. of mercury. This salt has, according to Dreser, <sup>357</sup>Mar. 25, '94; <sup>121</sup>July the remarkable property of being decomposed by electrolysis in such a manner that its mercury goes to the anode; for, in the preparation, the molecule of mercury does not exist in the metallic state, but in the form of a mercuric acid. Injections of this compound are, according to Dreser and Camerer, no more painful than ordinary injections of morphine. They produce no irritation or local caustic effect, and the dose may be exactly regulated, 1 gramme ( $15\frac{1}{2}$  grains) of chloride of mercury corresponding to 2.32 grammes (nearly 36 grains) of the hyposulphite of mercury and potassium. The solution for injection is made in the proportion of 0.25 gramme (nearly 4 grains) in 10 grammes ( $2\frac{1}{2}$  drachms) of distilled water. From  $\frac{1}{2}$  to 1 cubic centimetre ( $7\frac{3}{4}$  to  $15\frac{1}{2}$  minims of the solution is injected, corresponding to about  $\frac{1}{12}$  to  $\frac{1}{6}$  grain (0.005 to 0.01 gramme of corrosive sublimate).

N. Vertepoff <sup>530</sup>No. 5, '94 successfully used Neapolitan ointment in the treatment of malignant pustule. The ulcer was daily washed with sublimate, carefully wiped with cotton soaked in the same solution, in order to remove all the mortified portions, and covered with a piece of linen upon which the ointment had been spread. This dressing was removed only during the time required to wash the ulcer. Improvement was at once noted, and definite recovery took place within four or five weeks.

Schloesser <sup>169</sup>Apr., '94 experimented with oxycyanide of mercury, obtaining results confirmatory of those published by Chibret. The

drug is not irritant; its antiseptic action is fully equal to that of corrosive sublimate, while it does not injure surgical instruments. He used it in a solution of 1 or 2 per 1000. In a more concentrated solution it is caustic. Schloesser employed it in certain ocular affections with good results. The pain which it causes may be avoided by an application of cocaine.

Witthauer<sup>169</sup><sub>Mar., '94</sub> has had good results from the use of mercuric sozoiodol ointment in the treatment of ulcers of the legs. Having first cleaned the limbs by means of a bath he applies the following ointment: Mercuric sozoiodol, 1 gramme ( $15\frac{1}{2}$  grains); lanolin, 90 grammes (3 ounces); olive-oil, 10 grammes ( $2\frac{1}{2}$  fluidrachms). The ulcer rapidly changes and granulations form. The dressings are changed every four days. Basing himself on the favorable results obtained by Schwimmer from the subcutaneous injection of mercuric sozoiodol, Oro<sup>505</sup><sub>Feb. 27, '94</sub> tried the method in one hundred cases of syphilis, using the same solution as Schwimmer, viz.: Mercuric sozoiodol, 0.8 gramme ( $12\frac{1}{2}$  grains); iodide of potassium, 1.6 grammes ( $24\frac{3}{4}$  grains); distilled water, 10 grammes ( $2\frac{1}{2}$  fluidrachms). Of this solution he injected under the skin of robust patients a quantity containing 0.08 gramme ( $1\frac{1}{4}$  minims) of mercuric sozoiodol every eight or ten days, while in enfeebled subjects he began with doses of 0.04 to 0.06 gramme ( $\frac{2}{3}$  to 1 minim). Flat condylomata, roseola, and rheumatoid pains disappeared after two or three injections, and papules after three or four injections; purulent forms yielded to four or six and ulcerous forms to from five to ten injections. Mercuric sozoiodol approaches the insoluble salts of mercury in therapeutic effects without presenting their inconveniences. The author concludes that the method deserves to be tried on a grand scale; and that, although, like all preparations of mercury, it does not place the patient beyond the danger of a relapse, it seems to afford more protection in this respect than any other of them.

Cauchard<sup>2031</sup><sub>'04</sub> describes the favorable results obtained in syphilis from applications of traumaticin, which contains 25 per cent. of calomel. This method was recommended by Peroni, and Jullien, of Paris, has made use of it for over a year in his service at the St. Lazare Hospital. The patient is given a bath and the traumaticin painted over the skin wherever syphilitic manifestations are present; or if these be absent the back is painted with the

substance. When the chloroform evaporates a varnish is left which adheres to the skin. The applications are made three times weekly until the syphilitic symptoms disappear. Cauchard has seen secondary phenomena disappear within twenty to thirty days after five or six applications of the traumaticin, which appears to have the most effect upon papulous, pustular, and squamous syphilides. The method has the advantage of combining local and general treatment, and is especially indicated in weak patients who bear mercury badly, in children with hereditary syphilis, and in patients showing late cutaneous manifestations.

*Methylene-blue*.—See Aniline Dyes.

*Migrainin*.—Overlach<sup>69</sup><sub>No. 47, '93</sub> describes under this name a combination which, according to Ewald,<sup>293</sup><sub>Aug., '94</sub> contains 85 parts of antipyrin, 9 parts of caffeine, and 6 parts of citric acid. The ordinary dose for twenty-four hours is said to be about 1.1 grammes (17 grains), which may be increased to 2.2 grammes (34 grains). It is alleged not only that it cuts short the attacks of migraine, but that it lessens their frequency. It is reported to have been found useful also in headache due to influenza, alcohol, tobacco, and morphine. Bernheim<sup>69</sup><sub>No. 22, '94</sub> confirms the good results obtained by others with migrainin, having tried it in several cases of migraine.

*Monochlorophenol*.—See Chlorphenol.

*Morphine*.—See Opium.

*Myrrholine*.—Delmis, of Paris,<sup>100</sup><sub>Nov. 23, '93</sub> has experimented with myrrholine, an oleoresinous extract of myrrh which combines easily with creasote, is readily absorbed, and does not fatigue the digestive tract. In all simple catarrhal affections the effect of the remedy was rapid and certain; five persons suffering from bronchial catarrh were cured in the space of several days and two patients with influenza were immediately relieved. Creasoted myrrholine may also be employed in beginning phthisis and suspicious cases of laryngitis.

*Naphthalin*.—N. Koroleff<sup>530</sup><sub>No. 21, '93</sub> tried inhalations of naphthalin in fifteen cases of pertussis in children from 4 months to 11 years of age. From 15 to 20 grammes ( $3\frac{3}{4}$  to 5 drachms) of naphthalin were used for the inhalations, which were repeated four or five times daily. It may be evaporated in any vessel, care being taken to prevent it catching fire. Of the 15 cases 6 took but one inhalation; 5 received no benefit from the treatment; in the 4 remaining

cases the attacks ceased after the third day, expectoration becoming easy and only a simple cough remaining. These 4 cases were recent, 1 of them being only of one week's duration and the other 3 of two weeks. The number of attacks varied from six to twelve daily. The author cannot explain why the remedy was effectual in these cases and not in the others, but believes that the general condition was not responsible for the different effect produced. There were no disagreeable effects from the drug, but the friends of the patients objected to the odor, which penetrated everything and caused headache. V. Pedkow<sup>530</sup><sub>No. 24, '93</sub> recommends, in the treatment of insect-bites, rubbing the parts every few hours with 2 or 3 drops of saturated solution of naphthalin in liquid vaselin.

*Naphthol*.—E. H. Embley<sup>267</sup><sub>May 20, '94</sub> regards it as probable that the comparatively poor results obtained in the treatment of typhoid fever by the naphthols and naphthalin may be due to the defective method of administration, which has almost always been in the form of powder. Solid naphthol is irritant, and particles of the powder are apt to increase the intumescence of the affected intestinal glands when they lodge on them, and so tend to undo what good may result from the antiseptis. The reason of this is the insolubility of beta-naphthol in water; which, however, may readily be overcome by first dissolving the beta-naphthol by heat in olive- or sweet almond- oil (ten times its measure), and the resulting solution emulsified with powdered gum acacia; this, sweetened and flavored, makes a palatable emulsion. Being somewhat pungent, it requires dilution for children, who take it well. The author employs 4-grain (0.26 gramme) doses every four hours for adults, in a mixture such as this:  $\mathcal{R}$  Beta-naphthol, 1 drachm (4 grammes); ol. olivæ opt., 10 fluidrachms (40 cubic centimetres), dissolved with heat; Pulv. gum acaciæ, q. s.; ol. cassiæ, 6 minims (0.39 cubic centimetre); glycerini, 1 fluidounce (31 cubic centimetres); aquæ, ad 8 fluidounces (250 cubic centimetres). M. ft. emulsio, capiat  $\frac{1}{2}$  fluidounce (16 cubic centimetres) every four hours. It seems that though a large portion of the beta-naphthol passes down the alimentary canal unabsorbed and unchanged, rendering the entire tract less septic, some portion is absorbed and acts as a diaphoretic and soporific.

Maximovitch<sup>3</sup><sub>Jan. 24, '94</sub> believes alpha-naphthol (*q. v.*) to be three



times as powerful as beta-naphthol, and therefore preferable in typhoid fever and wherever intestinal antiseptics is indicated.

Spillman<sup>296</sup><sub>Sept. 8, '94</sub> cured a case of tuberculous peritonitis in a boy of 13 years by the injection of 10 cubic centimetres ( $2\frac{1}{2}$  fluidrachms) of camphorated naphthol into the abdomen with an exploring syringe. Rendu<sup>420</sup><sub>Mar. 2, '94</sub> in a similar case injected 5 cubic centimetres ( $1\frac{1}{4}$  fluidrachms) with a like successful result.

*Neurodin.*—This substance, which is, chemically, acetyl-paroxyphenyl-urethan, is very slightly soluble in cold water, and, according to von Mering,<sup>116</sup><sub>Dec., '93</sub> <sup>121</sup><sub>May, '94</sub> is an antineuralgic which, in the dose of 1 to 1.5 grammes ( $15\frac{1}{2}$  to 24 grains), is a succedaneum to phenacetin in the treatment of migraine and different forms of neuralgia. Pain ceases half an hour after absorption of the drug. It also has antipyretic power. A dose of 8 grains (0.52 gramme) will lower the temperature  $2^{\circ}$  or  $3^{\circ}$  C. ( $3.6^{\circ}$  to  $5.4^{\circ}$  F.). It sometimes, however, produces unpleasant effects, such as cyanosis, sweats, etc. The writer concludes that the drug should not be employed as an antipyretic, but only as an antineuralgic, in the dose of 1 gramme ( $15\frac{1}{2}$  grains) given in cachets. He thinks that the dose may, in certain cases, be increased to 4 or even 6 grammes (1 to  $1\frac{1}{2}$  drachms).

*Nitrite of Amyl.*—Schilling, of Berlin,<sup>22</sup><sub>Nov. 29, '93</sub> in a case of poisoning by amyl-nitrite, employed cocaine as an antidote, with success. The patient had accidentally spilled 3 grammes (46 minims) on the bosom of her dress and had not immediately changed it. She complained of the most violent headache, palpitation, dimness of vision, and yellow vision. Consciousness was retained, the gait was staggering, and the carotids pulsated violently. The author injected 1 gramme ( $15\frac{1}{2}$  minims) of a 5-per-cent. cocaine solution subcutaneously, and in a few minutes the worst symptoms of the poisoning subsided, and in fifteen minutes quite disappeared.

*Nitrite of Sodium.*—Gordon Sharp<sup>15</sup><sub>May, '94</sub> states that sodium nitrite, being stable, may replace the less stable amyl- and ethyl-nitrites. It dilates all the arterioles rapidly, and thus soon relieves the heart. Disagreeable symptoms may be overcome by prescribing it with ammonia-water or spirit of chloroform and small doses of morphine. It is most useful in anginal affections and in irregular heart-action. To obtain most benefit from its use it

should be continued some time after all symptoms have passed off. By this means the heart is able to regain its tone and so to repair itself. The maximum dose is 4 or at most 5 grains (0.24 to 0.31 gramme) and generally 1 or 2 grains (0.065 or 0.13 gramme) are enough. Graves's disease would appear to be aggravated, and bronchitis and asthma are not benefited by its use.

*Olive-Oil.*—Aussilloux <sup>67</sup><sub>Dec.15,'93</sub> <sup>5</sup><sub>Mar.,'94</sub> believes that one of four theories must be held in regard to the mode of action of olive-oil in hepatic colic: (1) direct action upon the calculus; (2) cholagogue action; (3) purgative action; (4) reflex action. The first appears to be with difficulty tenable, because there is no evidence that the oil reaches the stone; and, further, if the stones are immersed in oil they do not change their appearance or consistence. The cholagogue theory is more satisfactory, for the bile, secreted in abundance, may accumulate behind the stone and thus carry it forward; yet other cholagogues do not so act, and the relief comes too soon for this effect to be established. Its purgative action does not entirely account for its value as a remedy, for other more active purgatives do not succeed so well. The most satisfactory explanation is that given by Weil, that it has an analgesic effect upon the alimentary canal in that it stops the spasm of the biliary passages, and that later its cholagogue action favors the descent of the calculus. Two successful cases of nephritic colic are reported by the author in which this oil was useful. The dose formerly recommended was unnecessarily large. Several dessertspoonfuls may be taken at intervals more or less long, the mouth being rinsed before and after the dose with an alcoholic solution of mint. Olive-oil has been very popularly administered, from time immemorial, for all sorts of abdominal pains, and it is quite possible that scientific experiment will justify the empiricism.

*Opium.*—Cheadle <sup>1077</sup><sub>Sept.26,'94</sub> expresses the opinion that the systematic use of this remedy is too much neglected. He thinks that so much has been said of the ill effects of the constant use of opium that people have become afraid of it. The substitution of such drugs as chloral, sulphonal, etc., has meant not only the loss of valuable therapeutic effects, but also the establishment of habits producing results as bad as if not worse than those due to the constant use of opium. He also deprecates the almost universal use

of hypodermatic injections of morphine instead of the administration of opium by the mouth. The former practice he regards as less safe than the latter. Referring to the treatment of exophthalmic goitre, he recognizes the value both of digitalis and belladonna, but adds that "opium in full doses and at regular intervals not only soothes the nervous distress and palpitation, but arrests the diarrhoea and vomiting which all other drugs seem powerless to control." In the later stages of mitral and other cardiac affections, when cough, restlessness, and sleeplessness are troublesome, Cheadle finds opium in moderate doses by the mouth of great service. He does not share the fear that its depressant action on the respiratory centre renders it dangerous in these conditions. Hutchinson<sup>808</sup><sub>Jan., '94</sub> is in the habit of using it rather freely in minute doses, long continued, in a variety of ailments in elderly persons. It seems to favor the peripheral circulation and thus to help nutrition in distant parts. Carl Stern<sup>116</sup><sub>May, '94</sub> uses opium in cases in which the hoarseness, the barking cough, the stridor, the cyanosis, and finally the sinking in of the xiphoid process and lateral portions of the thorax point unmistakably to stenosis of the larynx. He reports several cases in which the use of opium averted an apparently necessary tracheotomy. Stern gives from 2 to 5 drops of the tincture of opium, according to the age of the child and the intensity of the symptoms, the dose being renewed according to the result obtained. For the most part, he gives a child 1 year old 3 drops in a teaspoonful of sweetened water. If no result is obtained after half an hour, 2 drops more are given. If the symptoms become more severe, the propriety of further medication or tracheotomy must be considered.

Moore, of Calcutta,<sup>1055</sup><sub>Jan. 1, '94</sub> has studied the preventive action of opium in intermittent fever. He has for some time observed that individuals suffering from rheumatism or febrile affections were more readily cured of these diseases if they had been in the habit of using opium. The drug seems to have not only a curative, but also a preventive, action, opium-smokers being almost immune in the fever-stricken districts of India. It appears probable to him that opium acts in the same manner in malaria as does quinine, paralyzing the hæmatozoa and making them easy victims of the phagocytes. G. Thin<sup>2</sup><sub>Dec. 22, '93</sub> does not agree with Moore, his own observations and those of other physicians practicing in the

East furnishing no proof that the prolonged use of opium prevents or cures intermittent fever.

L. Stembo<sup>21</sup><sub>No. 25, '94</sub> treated nine cases of epilepsy by Flechsig's method, though prescribing smaller doses of opium. He began with 0.02 to 0.06 gramme ( $\frac{1}{3}$  to 1 grain) several times daily, reaching 0.24 to 0.36 gramme ( $3\frac{1}{2}$  to  $5\frac{1}{2}$  grains) daily within a month. After a certain time he replaced opium by the bromides, which he administered for four weeks in doses of 3.75 to 7.50 grammes (58 to 117 grains) daily, gradually diminishing to 1.5 grammes ( $23\frac{1}{2}$  grains) daily, when treatment was discontinued. The results were satisfactory, and the author states that if all cases of epilepsy are not cured by Flechsig's method, they are, at least, greatly improved.

Kupffer<sup>3</sup><sub>No. 55, '94; Nov. 3</sub> has found morphine to be an active remedy in uterine inertia during labor. He employs the following formula: Muriate of morphine, 0.02 gramme ( $\frac{1}{3}$  grain); cherry-laurel water, 20.0 grammes (5 fluidrachms). A single dose is usually sufficient, but a second may be given if the pains weaken and the head is lodged deeply in the pelvis. At the moment of the expulsion of the head he usually administers a few whiffs of chloroform, thus obtaining greater relaxation of the perineum and a quieting of the pains. He also states that this drug is valuable in hastening tardy contractions when there is uterine hæmorrhage. Jumon<sup>108</sup><sub>Apr. 15, '94</sub> advises injections of morphine in grave syncope, from whatever cause, and quotes Lancereaux as stating that the physician should always carry with him a solution of morphine for such purposes.

Lancal<sup>868</sup><sub>May 26, '94</sub> describes a reaction which reveals the presence of morphine and oxymorphine in a solution of the strength of 1 to 20,000. A few drops of the liquid to be examined are placed in a porcelain capsule and then there is added an equal volume of a solution of 30 parts of uranium acetate and 20 parts of sodium acetate in 1000 of distilled water. The mixture is then evaporated over the water-bath. If the liquid contain morphine there remains a deposit, in the form of concentric rings of brownish-red or orange color.

Gibert<sup>577</sup><sub>Apr. '94</sub> reports a case of opium poisoning in a year-old child, to whom the mother by mistake administered a teaspoonful of Sydenham's laudanum. The father immediately gave the child as much milk as it could take, and afterward a tablespoonful of



syrup of ipecac. The milk coagulating in the stomach imprisoned the laudanum and the ipecac caused it to be vomited in the curds. The child's life was thus saved without any symptoms of poisoning, absorption not having taken place on account of the coagulation of the milk. The value of repeatedly washing out the stomach at short intervals is insisted on by L. P. Hamburger,<sup>764</sup> No. 42, '94 in order to remove the alkaloid as soon as it is eliminated by the gastric mucous membrane.

The treatment of morphine poisoning by permanganate of potassium is considered at length in the article on "Legal Medicine and Toxicology," vol. iv, section G.

*Organic Extracts.*—See Animal Extracts.

*Orthobromphenol.*—See Chlorphenol.

*Orthochlorphenol.*—See Chlorphenol.

*Oxygen.*—G. Newton Pitt<sup>22</sup>,<sup>673</sup> Jan. 24, '94; Mar. states that there are various conditions of extreme gravity which may be successfully combated by the inhalation of oxygen, as in some cases of severe pneumonia, especially when there is much lividity and cardiac affection, and at the crisis. It fails in other cases, and he is inclined to suggest that, where the condition is mainly cardiac failure and collapse, more benefit may be obtained than in cases where the serious condition is especially due to a wide-spread œdema or bronchitis. Some cases of severe bronchitis and asthma have, however, been benefited by it. In one of acute upon chronic bronchitis, in an elderly patient, there was some, though not very marked, relief of the dyspnœa. In cases of empyema, pneumothorax, and pleuritic effusion great relief can be afforded to the dyspnœa and cardiac failure until operative measures are undertaken. Feeble patients with phthisis may be relieved, but seldom with any marked change. Weakly convalescents and feeble cardiac cases often derive great benefit, and inhalations may be given periodically for weeks; but oxygen will not restore health,—it must simply be used as an adjuvant. Cases of chlorosis, pernicious anæmia, and leucocythæmia receive great temporary benefit, but the oxygen must be supplemented by other drugs. Conditions of asphyxia and lividity from respiratory engorgement, due to cerebral failure, and also coma from various causes, may be relieved. Its value in uræmia, though insisted upon by French writers, is still problematical. It may be of value in diminishing the risks of anæsthesia.

Catlin, of Brooklyn, <sup>1</sup><sub>Feb. 10, '94</sub> regards oxygen as a distinct remedial agent that should not be left untried until the patient is *in extremis*, and a sure and satisfactory stimulant, applicable to many conditions. In profound shock, from whatever cause, it has been found to exercise a reviving effect. It is taken up quickly by the blood, but its chief value is in its soothing effect upon the nerve-centres. In hæmorrhage from typhoid fever he has seen relief in many cases. It produces sleep, favors assimilation, and shortens the period of convalescence of typhoid fever. No agent is so well tolerated or so useful in restoring the equipoise of the physical condition. In cases of childbirth, pneumonia, bronchitis, and other exhausting diseases the use of oxygen is indicated at an early stage.

*Ozone*.—J. de Christmas <sup>262</sup><sub>Nov., '93</sub> has made some experiments to determine the antiseptic value of ozone. Culture-tubes of anthrax, staphylococcus aureus, typhoid bacillus, diphtheria bacillus, and the spores of *Aspergillus niger*, placed in an atmosphere containing 0.0015 to 0.002 gramme ( $\frac{1}{40}$  to  $\frac{1}{32}$  grain) of ozone per litre (quart) (0.061 to 0.1 per cent. in volume), remained sterile, the germs, with the exception of the aspergillus, dying at the end of five days. Fresh cultures of anthrax were killed in this atmosphere in ninety-six hours, development was retarded in forty-eight hours, while no effect was noticeable in twenty-four hours. The dried spores (bacillus subtilis) died at the end of eight days. There was no observable effect on spores placed in bouillon except a feeble absorption of the ozone by the fluid. Below 0.005 gramme ( $\frac{1}{20}$  grain) of ozone the air possessed no antiseptic power, and hence the author concludes that ozone, as a disinfectant, is without value, as, before the proper degree of saturation is obtained, the air ceases to be respirable. Labbé and Oudin <sup>14</sup><sub>Aug. 22, '94</sub> have observed an increase of hæmoglobin and an increased reducing power of the same in the blood of patients who have inhaled ozone, which they attribute to a chemical action, and not to simple excitation of the pulmonary surface and consequent increased blood-pressure. W. J. Morton, of New York, <sup>1</sup><sub>June 23, '94</sub> has published a very complete study upon ozone, its preparation, history, and therapeutic uses.

*Parachlorphenol*.—See Chlorphenol.

*Puraform*.—See Formol.

*Peppermint*.—See Menthol.

*Pepsin*.—P. N. Konovaloff<sup>2028 673</sup><sub>'93 ; Apr., '94</sub> has examined thirteen sorts of pepsin of the trade, and is convinced that there is not one of really good quality. Two-per-cent. aqueous solutions, although possessing considerable acidity, decay in two or three days. Normal gastric juice, when boiled or neutralized by caustic soda, forms an abundant flaky sediment, while pepsin of the trade yields but an insignificant sediment. The pepsin of the gastric juice acts best with 2 per cent. of hydrochloric acid; the trade pepsin, however, requires considerably-greater acidity, and for this reason its best action is manifested under conditions not natural to the stomach. The digestive power of trade pepsins is insignificant. According to the Russian Pharmacopœia, pepsin is only of good quality when 0.1 gramme ( $1\frac{1}{2}$  grains) will dissolve in four hours, with frequent shaking, 10 grammes ( $2\frac{1}{2}$  drachms) of the hard white of an egg rubbed through a sieve into 100 grammes ( $3\frac{1}{4}$  ounces) of a 0.25-per-cent. solution of hydrochloric acid at a temperature of  $38^{\circ}$  to  $40^{\circ}$  C. ( $100.4^{\circ}$  to  $104^{\circ}$  F.). Pepsins of the trade do not meet these requirements,—not even the official Russian soluble pepsin. The fluid obtained in the digestion of albumin by normal gastric juice is clear, transparent, colorless, without any smell, and filtrates quickly; while that obtained by artificial pepsin is muddy, yellow, has an unpleasant smell, and filtrates slowly. The normal ferment not only digests, but also peptonizes all albumin; manufactured pepsin, however, fails partially or entirely to peptonize. The quantity of ferment in these pepsins varies from 0.25 to 0.9 per cent., and the remaining 99 per cent. consists of albumins and other unnecessary admixtures. The quick decay of pepsin solutions and the formation of abundant sediment in them from tannic acid prove that the albuminous ingredients are undergoing decomposition. The general dose of 0.6 gramme ( $9\frac{1}{4}$  grains) for adults is too small, because the best results of manufactured pepsin are only obtained when they are used in 4- to 6-per-cent. solutions. Large quantities of pepsin being necessary to digest a small amount of albumin, the trade pepsins, on account of their impurity, if administered in large quantities produce favorable conditions for the development of Brieger's peptotoxin. The author thinks that the best substitute for these pepsins is the pure gastric juice obtained from dogs according to Pavloff's method, which is

as follows: Gastric and œsophageal fistulæ are made, and during apparent feeding (the food entering the stomach) a considerable quantity of gastric juice can be withdrawn. It is said to be pure, of strong digestive power, the amount of peptone averaging 15 per cent. and of acid 0.5 per cent. (Report of Dr. Drzewiecki, corr. editor.)

*Petroleum*.—M. Gottlieb, of Warsaw, <sup>586</sup><sub>No. 23, '94</sub> fully confirms P. I. Kostenko's observations on the curative effects of crude kerosene in diphtheria. <sup>109</sup><sub>Mar., '94</sub> The remedy was applied locally by means of a cotton-wool swab, the procedure being repeated four times daily. A rapid recovery took place in five successive cases previously treated by various other means without any benefit whatever. Pelissier <sup>67</sup><sub>v. 126, p. 416</sub> <sup>814</sup><sub>Aug. 15, '94</sub> has used petroleum in pulmonary tuberculosis for the past two years. He administers it in capsules, and is said to have obtained marked success,—the cough and sweats soon ceasing, appetite and sleep returning, and the pulmonary lesions receding. He also made the patients breathe air that had passed through petroleum. Rectal application did not prove serviceable. The ordinary dose of crude petroleum is 10 to 30 minims (0.65 to 2 cubic centimetres). Desprès <sup>317</sup><sub>No. 48, '93</sub> <sup>19</sup><sub>Mar. 24, '94</sub> recommends ordinary refined coal-oil in the treatment of cancer and vaginitis. In ordinary inoperable carcinoma of the uterus he injects it into the tumor and applies it on tampons in the vagina or uses it in irrigations. Injected into abscesses it causes healing to take place, removes the disagreeable odor of disintegrating carcinomata,—especially of the uterus,—causes the gangrenous surfaces to be cast off and the ulcerations to become dry. In vaginitis he has also employed it with success as injections, and claims that after three daily injections of 4 to 5 ounces (124 to 155 cubic centimetres) of the oil, a cure will be obtained in six days. Petroleum has the advantage of being easily diffused, deodorizing and disinfecting and yet not irritating the mucous membranes. If applied to an already inflamed mucous membrane it causes vesicles to form. The patients did not complain of the odor, nor was their general health affected.

*Phenic Acid*.—See Carbolic Acid.

*Phenocoll*.—Salvo Arcangelo, <sup>589</sup><sub>Mar. 29, '94</sub> after calling attention to the numerous and conflicting statements which have been made about the value of this remedy, summarizes his own opinion as follows: Phenocoll is worthy of an important position among the



newer drugs; it is a powerful antimalarial agent, a worthy supplement to quinine; it is invaluable in rheumatism of acute character, but useless in chronic rheumatism; it is of great value in infantile therapeutics, especially in cases of malaria, typhoid, or rheumatism; it is a good antiseptic, of especial service as an intestinal antiseptic; it has but little value as an antineuralgic. Pucci, of Rocca Bernarda, <sup>673</sup><sub>May, '94</sub> treated twenty patients with hydrochlorate of phenocoll, giving from  $\frac{1}{2}$  to 1 gramme ( $7\frac{3}{4}$  to  $15\frac{1}{2}$  grains) daily, in doses of from 0.15 to 0.25 gramme ( $2\frac{1}{4}$  to 4 grains), between the intervals of the attack. The remedy was continued for five or six days, combined with quinine, arsenic, or iron. Of the twenty cases cure resulted in seventeen. The medicine should be given fasting, the last dose being taken four or five hours before an expected attack. It was well tolerated and caused no digestive disturbances. It acts as a stimulant of the red corpuscles and combats the effects of the hæmatozoön. The author has also used it in influenza and rheumatic neuralgia; when the former was not complicated by some pulmonary affection it yielded to the remedy in two or three cases; neuralgia was more rebellious and cure was obtained in only one of three cases. Hydrochlorate of phenocoll appears, therefore, to be a succedaneum of quinine, sometimes succeeding where the latter remedy is not tolerated. It may be successfully employed even in abnormal and complicated forms of malaria. In two cases of ictero-hæmaturic fever it brought about a cure, although used alone without quinine.

Clement Ferreira <sup>296</sup><sub>Jan. 24, '94</sub> used this drug in cases of acute and febrile tuberculosis, giving 0.5 gramme ( $7\frac{3}{4}$  grains) daily in two doses, during a period of eight days. The fall of temperature was not accompanied by adynamic effects or profuse sweating. Vogt obtained <sup>73</sup><sub>Aug. 4, '94</sub> favorable results from its use when similar remedies, such as antipyrin and the salicylates, had failed or were badly borne. He notes the great tolerance of patients for phenocoll, which may be prescribed for five or six days without inconvenience. He agrees with Eichhorst that, although it does not show the remarkable action of salicylate of sodium in rheumatism, still it is of great value in cases of rheumatism where it becomes necessary to keep up medication or to combat frequently-recurring attacks. J. Hobart Egbert <sup>826</sup><sub>Jan., '94</sub> reports a case of malarial fever of typhoid form, with prostration and diarrhœa, in which quinine had failed

and which yielded rapidly to hydrochlorate of phenocoll. He also regards the drug as of value in typhoid fever, where it acts both as an antiseptic and antipyretic. It moderates the fever, soothes the pains, and especially relieves the headache in influenza, shortening the duration of the attack and preventing complications. It is an excellent antipyretic in acute pneumonia. H. Kacharewski<sup>21</sup><sub>No. 35, '94</sub> tried it in fifteen cases, finding it to be a good antipyretic and without unpleasant effects. Ugolino Mosso and Fausto Faggioli regard it<sup>409</sup><sub>v. 20, No. 2, '94</sub> as possessing an antiseptic and antifermentative action, though inferior to quinine.

*Picrotoxin*.—Semmola and Gioffredi, of Naples,<sup>673</sup><sub>Dec., '93</sub> remark upon the necessity, before administering an antisudorific, of thoroughly understanding the pathogeny of the secretory disturbance. If this be due to irritation of the sudoriparous nerves, remedies such as agaricine, atropine, etc., should be given; but, if it be due to central vasomotor paralysis, excitants, such as picrotoxin, should be administered. They report the case of a woman, 43 years old, affected with hyperhidrosis consecutive to influenza, frequently occurring in combination with peripheral vasomotor disturbances, in the form of more or less extensive red patches. There was no functional or subjective alteration of the nervous system. Atropine, agaricine, camphor, camphoric acid, gallic acid, etc, were tried without success. Picrotoxin was then employed, and three days later the sweating began to diminish, and within eight days completely disappeared. The daily dose used was 0.001 gramme ( $\frac{1}{64}$  grain).

*Pilocarpine*.—E. M. Holmes<sup>744</sup><sub>June 23, '94</sub> states that during the last year the leaves of *Pilocarpus microphyllus* and *Pilocarpus trachylophus*, called also *Ceará jaborandi*, because imported from Ceará, have been placed on the market as a substitute for the leaves of *Pilocarpus jaborandi*. This new form of jaborandi when chewed does not cause a free flow of saliva, but only gives rise to a pungent taste in the mouth. According to Paul and Cownley, *Ceará jaborandi* does not contain any considerable amount of a base forming a crystalline nitrate, corresponding to the salt of pilocarpine, and the alkaloid contained in it is to some extent decomposed by lime, whilst pilocarpine is not. This being the case, the physiological action of jaborandi may in some instances be sought for in vain. L. Sabbatani<sup>409</sup><sub>v. 19, p. 475</sub> finds that pilocarpine has a distinct

diuretic action, which is ordinarily disguised by the increase of the other secretions, and, in cases of poisoning, by vomiting and diarrhoea. Sziklai<sup>84</sup><sub>Nos. 32, 33, '04</sub> looks upon pilocarpine as a specific for croup and all croupous diseases,—*e g.*, croupous laryngitis, croupous bronchitis, croupous pneumonia, croupous nephritis, etc. Its action begins at once. In laryngitis crouposa cure is to be obtained in a few hours; in pneumonia crouposa, in two or three days. The drug can be given by the mouth, subcutaneously, or in suppository. In urgent cases subcutaneous injection is to be preferred. The duration of the disease is notably shortened by the use of pilocarpine and the mortality reduced to *nil*. In suitable cases, given early, it has a preventive action. Twice the official dose causes no ill effects. The daily doses advised by him are as follow: Up to 1 year, 0.01 to 0.02 gramme ( $\frac{1}{6}$  to  $\frac{1}{3}$  grain); 1 to 3 years, 0.02 to 0.03 gramme ( $\frac{1}{3}$  to  $\frac{1}{2}$  grain); 3 to 6 years, 0.04 gramme ( $\frac{2}{3}$  grain); 6 to 10 years, 0.05 gramme ( $\frac{7}{8}$  grain); 10 to 15 years, 0.06 to 0.07 gramme (1 to  $1\frac{1}{8}$  grain); adults, 0.08 to 1 gramme ( $1\frac{1}{4}$  to  $15\frac{1}{2}$  grains).

Drappier, of Auvillers-les-Forges,<sup>220</sup><sub>Sept. 15, '94</sub> calls attention to the fact that, though sodium salicylate may be regarded as a specific in articular rheumatism, it sometimes causes toxic symptoms so grave as to render its use impossible. In one such case, a patient who suffered from two or three attacks of rheumatism yearly, he used hypodermatic injections of pilocarpine, formerly advocated for the disease, using 0.01 gramme ( $\frac{1}{6}$  grain), which led to complete recovery within six days.

Hartcop<sup>319</sup><sub>No. 41, '94</sub> finds pilocarpine of great service as a sialagogue, in doses of 0.01 to 0.02 gramme ( $\frac{1}{6}$  to  $\frac{1}{3}$  grain) by subcutaneous injection. He has observed marked benefit from its use in cases of uræmia, beginning meningitis, chronic meningitis; in affections of the naso-pharynx and larynx, especially in œdema of the glottis; in scarlatinal nephritis, and in the initial stages of peripheral and spinal affections. It is sometimes desirable to associate it with iodide of potassium and red iodide of mercury. Salinger<sup>80</sup><sub>Mar. 15, '94</sub> recommends hypodermatic injections of pilocarpine in facial erysipelas, as proposed some years since by Da Costa. He treated 28 cases in this manner, all severe, 20 presenting albuminuria and 4 retention of urine. The drug must be administered until the physiological effects are produced,—*viz.*, profuse perspiration, ptyal-

ism, and increased secretion of the urine. Recovery took place in all his cases within eight days at latest, and in some cases in four days. Pilocarpine is contra-indicated in affections of the heart, where its action upon the circulation might be too depressing. If the erysipelas appear as a complication, the treatment is absolutely without efficacy. G. W. Barr, <sup>80</sup>May 15, '94, who has also had good results with the drug in erysipelas, believes that its efficacy depends on the time which has elapsed from the inception of the first symptoms before treatment is begun. In cases seen very early success is almost invariable.

Three cases of Ménière's disease are reported by Labit <sup>136</sup>Sept. 1, '94; <sup>80</sup>Nov. 15 in which the hypodermatic use of pilocarpine gave satisfactory results. In one of the cases the hearing was improved only; in the other two, typical cases, the good effects of the drug were unmistakably manifest, as shown by a careful functional examination of the ear before and after treatment. The author believes that, of all the treatments employed in Ménière's disease,—such as the ingestion of the sulphate of quinine, iodide of potassium, the application of electricity, etc.,—the subcutaneous injection of pilocarpine is one of the most rational. The disorder is caused, in the majority of cases, by a sudden hæmorrhage into the labyrinth, producing directly irritation or compression of the peripheral terminations of the acoustic nerve and of those of the semicircular canals. Since it is a well-established fact that pilocarpine, employed hypodermatically, renders good service in pleuritic and peritoneal effusions, as well as in general exudations, it is reasonable to suppose that a similar action of the drug is exercised in like affections of the middle ear. The results obtained in the three cases reported seem to bear out this belief. The medicament was given in daily doses of from 0.0025 gramme ( $\frac{1}{25}$  grain) to 0.015 gramme ( $\frac{1}{4}$  grain), and even as high as 0.02 gramme ( $\frac{1}{5}$  grain). These injections were generally followed by sialorrhœa and profuse diaphoresis.

Rémy <sup>173</sup>Oct., '93; <sup>2</sup>Jan. 6, '94 relates a case of white atrophy of the optic nerves in which pilocarpine had been ordered for subcutaneous injection. The effect of the injection was most alarming to the patient, but treatment was continued and the number of injections was increased. Finally, shortly after one injection, the patient fell back dead. In another case pilocarpine was given subcutaneously, to hasten recovery from a cerebral embolism; after its use



the patient was seized with a series of epileptic attacks, which passed off when the drug was discontinued. The author relates other cases which have come to his knowledge of dangerous symptoms following the subcutaneous use of pilocarpine.

*Piperazine*.—D. D. Stewart <sup>80</sup><sub>Feb., '94</sub> discusses the influence of this drug on the urine, and especially on uric acid and urea excretion. In three cases previously reported the uric-acid excretion was abnormally high and the daily fluctuations often extensive. It was not apparent, however, that excretion of either uric acid or of urea, or even the degree of acidity of the urine, was markedly influenced by the drug in the doses administered, the average of which was  $\frac{1}{2}$  drachm (2 grammes),—double that previously used by most observers. The bulk of the evidence, however, was to the effect that this drug, although it has, *in vitro*, a markedly-disintegrating effect on uric acid, with which it forms the most soluble known salt of the latter, does not actually, in the doses ordinarily administered, increase uratic excretion, however much benefit it seems to exert on cases dependent upon impairment of such excretion. One observation upon a patient suffering from chronic Bright's disease showed that there was actually a slight diminution not only in the amount of urine, but in the more important urinary constituents, notably uric acid and urea. The difference is, however, too slight to be explained by any influence exerted by the drug upon the kidney. An observation made upon a patient suffering from chronic arthritis of gouty origin, and due to the deposit of urates in the joints through imperfect excretion on account of inadequate kidneys in which very large doses were used (70 grains—4.65 grammes—per diem), showed conclusively that the drug is practically without effect upon uric-acid excretion. Apparently this drug does exert a salutary effect upon the uric-acid condition; the only mode of action possible is such as has been attributed to certain of the alkalies,—as vegetable acid salts of potash. The increased alkalinity of the blood these latter produce is supposed to promote its oxidation function, increasing the formation of urea, and perhaps, also, transforming a modicum of the uric acid, by oxidation, into the former or into a second, more oxidized, product than uric acid, such as bodies of the alloxan or allantoin series. Though no data are at hand showing that such a transformation of uric acid into urea does take place in the

organism, the fact that uric acid is so closely related to the latter tends to indicate that such a metamorphosis may occur in the human organism under favorable conditions. An investigation of the action of the drug from this stand-point may throw light upon its action, otherwise so obscure. The urea formed from a portion of the uric acid would, of course, be in such small quantity as to be practically unrecognized by quantitative tests because of the normal daily variation. The detection of the presence of allantoin or alloxan in any quantity in the urine under the use of this drug could be more easily interpreted. Untoward effects have been noticed when large doses have been given: feelings of nervousness and apprehension; intermittent clonic spasms of the upper extremities, spreading to the muscles of the abdomen and legs, the patient becoming dazed, unable to think clearly, for some hours partly unconscious; muscular prostration with inco-ordination, coarse tremors, uncertainty of gait for several days, due rather to impairment of co-ordination than to any paretic condition of the muscles. Since untoward symptoms were caused by drugs from different manufacturers, it is evident that the toxic principle exists in the drug, though not to the same extent in equal amounts.

Blanc <sup>108</sup> <sub>No. 3, 94; Apr.</sub> 5 has reviewed the literature of this remedy, which it was hoped would cure gouty affections more surely than colchicine and more rapidly than lithia. The latter can be used only in small doses, because it rapidly exhausts the kidneys and disturbs digestion, therefore it is a slow treatment, and it is not exempt from inconveniences. Theoretically the use of piperazine is very encouraging. It is an alkaloid of the pyridine group, and is not poisonous nor irritant; it is very soluble in water, even deliquescent. The combination of urate of soda and this drug is nearly nine times more soluble than the urate of lithia. In daily doses of from 15 to 45 grains (1 to 3 grammes) it is without marked effect, unless a diuretic one. Vogt has found that under 15-grain (1 gramme) daily doses the amount of urates is decreased, while that of urea is increased. This goes to show that not only does this drug dissolve urates, but acts as an oxidizing agent and modifies tissue change. On the other hand, the amount of nitrogen eliminated is not increased, which shows that there is no increase of waste nor supplementary decomposition of albuminoids.

The piperazine is excreted, undecomposed, by the kidneys. If used hypodermatically it causes acute pain and an infiltration more or less marked, and sometimes an abscess. It has been strongly recommended for gout, as it relieves the pain, frees the engorged joints, and expels renal calculi. Patients who have suffered from nephritic colic some days after the use of the drug experience a recrudescence of the pain, followed by the expulsion of calculi, apparently diminished in size by the action of the drug. In this respect it appears to act with less danger than the alkalies, and more rapidly than the flushing out of the kidneys with Vittel or Contrexéville waters. On the other hand, relief is sometimes slow and sometimes it is without effect, while colchicine, when properly used, is far more rapid. It is believed that the drug should be used, especially when others have failed, in from 15 to 30 grains (1 to 2 grammes) per diem, dissolved in a carbonated water, taken in two doses, fasting, if possible.

John Gordon<sup>2</sup><sub>June 16, '94</sub> formulates the following conclusions: 1. Piperazine is not wholly oxidized in the body, and may be detected in the urine of those to whom it is exhibited. 2. In solutions of 1 per cent. in normal urine, when kept in contact at a temperature of 39° C. (102.2° F.) for a given time, it has the property of dissolving to a great extent a fragment of a uric-acid calculus. 3. The stronger the solution of piperazine in urine (up to 7.5—), the earlier did the solvent action begin and the more rapid was the completion. 4. Notwithstanding this, with the stronger solutions of piperazine in urine the rate of solubility was not so markedly rapid over the weaker solutions as might be expected. 5. The solvent action in similar circumstances was greater than any other of the substances employed,—namely, borax, lithium citrate, sodium carbonate, and potassium citrate. 6. Piperazine, in weak and strong solutions in urine, converted the undissolved portion of the calculus into a soft granular or pulpy condition. 7. Neither borax, lithium citrate, sodium carbonate, nor potassium citrate, in similar circumstances, rendered the fragment of calculus soft or pulpy.

Wild<sup>2</sup><sub>Jan. 27, '94</sub> reports the results of a number of experiments upon the pharmacological action of piperazine. Deposits of urate of soda in the tissues of gouty patients were removed in less than twenty-four hours, when pieces of the tissues were placed in a

solution of 1 part of piperazine in 500 of water, both at 15° C. (59° F.) and at 37° C. (98.6° F.). The histological characters of the tissues were uninjured on microscopical examination. Crystals of pure uric acid were only partially dissolved, and uric-acid calculi little affected, by the same solution. On the living tissues a solution of 1 in 1000 normal saline solution always caused marked contraction of the arterioles when artificially circulated through the vessels of a frog; the same solution was harmless to the muscles of the frog, which gave good contractions after soaking for twenty-four hours in the solution. A 1 in 100 solution was, however, very irritating, causing immediately an increased contraction and death of the muscle in thirty to forty minutes. The indications for the drug were those conditions of uric-acid diathesis attended by deposits of urates in the tissues. In renal and vesical calculi, rheumatism, or rheumatoid arthritis, benefit was much less likely to be derived. In the increasing of arterial tension piperazine appeared to act as a vascular diuretic somewhat comparable to digitalis. The drug ought to be given in a large quantity of water, and not used subcutaneously, on account of the irritant action of strong solutions. Biesenthal,<sup>26</sup><sub>Nov., '94</sub> from experiments on animals, believes it certain that piperazine can cause the disappearance of gouty deposits. Sir William Roberts, of London,<sup>15</sup><sub>July, '94</sub> has, however, expressed the opinion that it has little or no effect in the treatment of gouty states; and the recent results of Bohland<sup>116</sup><sub>May, '94</sub> tend to confirm this. The latter believes that the treatment with piperazine of concretion and calculous formation in the kidneys and bladder of individuals of a uric-acid diathesis is quite useless, for calculi already formed can neither be dissolved nor prevented from growing larger. Egoroff<sup>859</sup><sub>No. 34, '94</sub>,<sup>26</sup><sub>Nov.</sub> relates a case of excruciating renal colic in a woman, the attacks recurring two or three times every month. The usual treatment by mineral waters and careful dieting having utterly failed, the author decided to try the internal administration of piperazine in the daily dose of 1 gramme (15½ grains). The attacks became mild, while the urine assumed a peculiar reddish color (due to the presence of urate of piperazine). During one such attack the patient voided with her urine a brownish, corroded, small-sized stone, after which the reddish tint became nearly imperceptible, and then disappeared altogether. Shortly afterward the attacks ceased, and up to the



time of the report—a year and a half—had not recurred. John Kinlock<sup>1</sup><sub>Aug. 18, '94</sub> has also had good results from the use of the remedy in renal colic; while Carter<sup>187</sup><sub>July, '94</sub> observes that, whatever its action, the effect seems to be better when the urine is kept alkaline.

P. Schmey<sup>116</sup><sub>Sept., '94</sub> proposes its use in cystitis on account of its energetic antiseptic action, and Hildebrandt,<sup>4</sup><sub>Feb. 5, '94</sub> after experiments on animals, suggests its use in diabetes, administered half an hour before or after meals, the gastric juice being previously neutralized by sodium bicarbonate.

*Pixol.*—See Tar.

*Podophyllotoxin.*—This is a substance that was first obtained from podophyllin by Podwyssotski. It has recently been experimented with by Spindler, of Dorpat,<sup>586</sup><sub>No. 2, '94</sub> <sup>6</sup><sub>V. 2, p. 212</sub> who finds that in animals it induces, in large doses, inflammation of the intestinal mucous membrane, causing vomiting, diarrhœa with bloody stools, paralysis of the hind-limbs, parenchymatous nephritis, and death. In small doses it is a very excellent laxative. He prescribes for persons with constipation 0.02 to 0.03 gramme ( $\frac{1}{3}$  to  $\frac{1}{2}$  grain) of podophyllin in pills, containing 20 to 30 per cent. of podophyllotoxin, or a 1-per-cent. alcoholic solution in doses of 20 to 30 drops, which usually results in a normal stool. Sometimes, indeed, a single dose will cause an habitually constipated patient to go to stool regularly every day for a week or more. One great advantage enjoyed by podophyllotoxin over most other laxatives is that it does not bind the bowels afterward. Spindler tried the effect of hypodermatic injections of this substance, but was obliged to desist owing to the intense pain produced at the point of insertion. The amount of podophyllotoxin existing in podophyllin resin is from 20 to 30 per cent.

*Potassium.*—Bichromate of potassium in small doses has been used in gastric affections for the last ten years by Drysdale<sup>6</sup><sub>Apr. 14, '94</sub> with unvarying good results. In ten cases described by him symptoms of ulcer had been present at some previous time.

Lewin<sup>69</sup><sub>p. 551, '94</sub> advocates the use of borax-tartar (potassium and sodium borotartrate) as a diuretic, in doses of 10 to 25 grammes ( $2\frac{1}{2}$  to  $6\frac{1}{4}$  drachms) daily, in water or bouillon.

Catrin<sup>420</sup><sub>Aug., '94</sub> has tried permanganate of potassium in the treatment of diphtheria. He penciled and washed the affected parts every two, three, or four hours with a  $\frac{1}{2}$ -per-cent. solution of the

salt. Under the influence of this treatment the membranes always rapidly disappeared. This treatment is also very efficacious in simple sore throat. Troitski <sup>19</sup><sub>Oct. 20, '94</sub> recommends the drug in the treatment of thrush. Its use as an antidote in morphine and phosphorus has been much discussed during the year, and is fully considered in the department of "Legal Medicine and Toxicology" (vol. iv, section G) of the ANNUAL.

Markwald <sup>319</sup><sub>July 14, '94</sub>; <sup>2</sup><sub>Aug. 11</sub> relates a case of poisoning by potassium chlorate in a man aged 53 years. A 3-per-cent. solution was ordered for the purpose of gargling every two hours. On the next day the tonsillitis was subsiding, and he was feeling fairly well. During the following night he had severe pain in the stomach and lower abdomen, vomiting, and diarrhœa. Four hours later severe collapse was present, the vomiting and pain continuing. The pulse was small and rapid. The urine, passed shortly afterward, was of a deep-brown color, and contained hæmoglobin, no red blood-cells, fairly-abundant hyaline casts covered with granules, and renal epithelium. On the second day the color was deeper, but in the course of the next few days it became clear and no more casts were found. The author says that the blood also showed the characteristic changes seen in hæmoglobinæmia. Some jaundice was noted on the second day, lasting four days. The patient steadily recovered, and in about twelve days was perfectly well. He had used the gargle more frequently than directed, and had also roughly made the solution for himself. It was calculated that he had used 17 grammes ( $4\frac{1}{4}$  drachms) of the salt in about 3 litres (quarts) of water. He was not aware of having swallowed any. The author thinks that there must have been some idiosyncrasy present, and it was ascertained that the patient had previously had unpleasant symptoms after the use of potassium-chlorate gargle. As regards treatment, the collapse must be warded off and large quantities of fluid given by the mouth to flush the kidneys. Eventually venesection and the infusion of saline solution may be necessary.

*Propylamin.*—This is the isomer of trimethylamin, from which it differs in its melting-point and the form of its crystals. It gives out a strong ammoniacal odor, and has an alkaline reaction. Weiss <sup>283</sup><sub>No. 42, '94</sub> treated five cases of chorea with propylamin, the results being quite successful. The choreic movements, convul-

sions, and accompanying excitement yielded rapidly to the remedy. In order to succeed with the drug, however, it is necessary to give doses of from 2 to 4 grammes ( $\frac{1}{2}$  to 1 drachm) daily, and in severe cases even 6 or 7 grammes ( $1\frac{1}{2}$  to  $1\frac{3}{4}$  drachms). In one case, that of a boy 10 years old, the author gave as much as 10 grammes ( $2\frac{1}{2}$  drachms) daily. Children support the remedy well, and no untoward symptoms present themselves. The formula used by Weiss was as follows: Propylamin, 2 to 7 grammes ( $\frac{1}{2}$  to  $1\frac{3}{4}$  drachms); distilled water, 80 grammes ( $2\frac{1}{2}$  fluidounces); syrup of peppermint, 25 grammes ( $6\frac{1}{2}$  fluidrachms). To be taken in one day.

*Pyoktanin*.—See Aniline Dyes.

*Pyridine*.—Blanc <sup>108</sup><sub>No.1, '04</sub>; <sup>5</sup><sub>Mar.</sub> presents a careful study of this singular alkaloid. Possessing the formula  $C_5H_5N$ , it is a colorless, very fluid substance, of an excessively-penetrating odor. Soluble in water and in alcohol in all proportions; it also yields crystalline salts which are, as well, soluble in these liquids. If inhaled in small doses it produces slight somnolence, headache (with congestion of the face), and sometimes a little vertigo. The inspiration acquires a remarkable amplitude, the blood-pressure diminishes, and there is a general vaso-dilatation. The excito-motor power of the medulla and spinal cord is profoundly changed, their excitability being calmed. The bronchial secretion is somewhat increased. The absorption of pyridine by the air-passages is rapid and elimination by the urine almost equally so, being complete within fifteen minutes; it is also eliminated by the lungs and the glandular apparatus of the digestive tract, thus increasing the gastric secretion, exciting the appetite, and favoring digestion. This rapid elimination permits the use of enormous doses with perfect safety. It has also some antiseptic properties, and, being non-irritant, it can be used, as has been shown by Jullien, in from 1- to 10-per-cent. solution, in the treatment of urethral blennorrhœas in the male and female. Its most important use, however, is in the treatment of asthma and emphysema. Under the influence of this drug the respiration in asthma becomes free, the expectoration more fluid and less purulent and foul. Auscultation determines that the sibilant râles disappear and are replaced by the mucous ones. Even in cardiac asthma the remedy is preferable to morphine, although for continued relief the treatment

must be based upon iodide of potassium. It is useful in angina pectoris because its vaso-dilating effect extends to the coronary arteries, and it should be used by inhalation for fifteen minutes each morning and night. Daudier has reported benefit from its inhalation in subacute traumatic tetanus. Although it is best used by inhalation for twenty minutes from a napkin upon which are poured several drops, it can be administered by the mouth in capsules. If used for urethritis a tampon moistened in a 1- to 10-per-cent. aqueous solution can be applied to the meatus, or an injection of the same strength can be administered. R. W. Watson<sup>5</sup><sub>Mar., '94</sub> states that, although he has used this remedy with brilliant success in several cases in which the symptom of asthma demanded immediate relief, he has never been able to induce a patient to inhale it for a second attack because of its disagreeable, penetrating, and lasting odor. A case of poisoning by pyridine is recorded by Helme,<sup>2</sup><sub>Oct. 14, '93</sub> about half a cupful having been swallowed.

*Quinine.*—Laborde, of Paris,<sup>10</sup><sub>July 3, '94</sub> in discussing the experimental studies of Grimaux and Arnaud on certain chemical bodies belonging to the quinine series (see "Experimental Therapeutics," B-18), stated that he had tried one of these homologues—cupreine—and found it of service in a case of rheumatism. Bourru<sup>164</sup><sub>July 6, '94</sub><sup>121</sup><sub>Sept.</sub> also undertook a clinical investigation of the soluble salts—hydrochlorate of cupreine, sulphate of quinethyline, and sulphate of quinopropyline. The first was given to eight patients suffering from malarial fever without complications, and was found to possess but little antiperiodic action in doses of less than 1 gramme ( $15\frac{1}{2}$  grains). Its action is slow and not exerted during the first paroxysm. Its influence in malaria seems to be but half that of sulphate of quinine. As regards its antipyretic effect, in several instances the dose of 0.50 gramme ( $7\frac{3}{4}$  grains) caused a reduction of  $0.4^{\circ}$  to  $0.5^{\circ}$  C. ( $0.7^{\circ}$  to  $0.9^{\circ}$  F.), beginning half an hour after administration and sometimes persisting throughout the day. Nevertheless, in the dose of 1 gramme ( $15\frac{1}{2}$  grains) it was powerless to lower the high fever of a case of tonsillar abscess. In the doses mentioned this salt produced no ill effects, such as malaise, vertigo, ringing in the ears, etc. The pulse was unaffected. The general conclusion drawn by Bourru is that, to obtain decided results, cupreine must be given in high



doses from the beginning (1, 1.5, or 2 grammes— $15\frac{1}{2}$ , 24, or 31 grains—or even more).

Sulphate of quinethyline was administered to eight patients, seven of whom were afflicted with malarial fever of different types. Doses of 0.75 gramme (12 grains) were found to effectually prevent a recurrence of the paroxysm. In this amount it caused some ringing of the ears. To be successful it was necessary to administer the drug several hours before the expected chill. In one case 0.50 gramme ( $7\frac{3}{4}$  grains) of sulphate of quinethyline broke up an attack which had resisted the influence of 0.75 gramme (12 grains) of sulphate of quinine. In other cases it succeeded where larger doses of quinine had failed. In an obscure case, which simulated tubercular meningitis, the patient being a girl of 14 years, four doses of 0.50 gramme ( $7\frac{3}{4}$  grains) each of sulphate of quinethyline brought about recovery after ten doses of quinine had been given without benefit. Quinethyline appears to be superior as an antiperiodic to quinine. Its antipyretic action was not expressly studied, but in several cases it was observed that the temperature was lower in the evening than in the morning or, at least, equal when the quinethyline had been administered in the forenoon. This fact would indicate that it occasions a reduction of temperature lasting for a number of hours. In the doses employed (0.75 gramme—12 grains—as a maximum) quinethyline did not excite vertigo, ringing in the ears, nausea, or any other unpleasant manifestations.

Sulphate of quinopropylene was employed in seven cases of malarial intermittent fever, being found to possess a more energetic antiperiodic action than quinine. It is likewise more powerful than quinethyline. In a case of typhoid fever it exerted a remarkable antipyretic influence. Toxic manifestations, such as buzzing in the ears, vertigo, nausea, and general malaise, were experienced by all the patients after a dose of 0.50 gramme ( $7\frac{3}{4}$  grains). The general conclusion is that cupreine is efficient in twice the dose of quinine, while quinethyline can only be given in about three-fourths and quinopropylene in one-half the dose of quinine.

Hernandez Briz <sup>632</sup> <sub>Feb. 22, '94; Mar. 24</sub> <sup>2</sup> states that during the whole of 1893 he had experimented with a new salt—hydrochlorosulphate of quinine—for which he claims advantages which render it superior

to other quinine salts for purposes of hypodermatic injection. It is not a mere mixture of hydrochlorate and sulphate of quinine, but a genuine combination. The substance crystallizes in prisms and makes an amber-colored solution with water. Its special advantage is said to be its remarkable solubility, one gramme of the substance dissolving in one gramme of water. Among more than 200 injections there was not one in which any ill effect was produced, and the medicament was rapidly absorbed in every case. It is recommended that the injections should be made deeply with all antiseptic precautions. At first Briz injected only half a Pravaz syringe of the solution,—that is to say, 0.50 gramme ( $7\frac{3}{4}$  grains) of the salt with half a gramme of water; afterward he injected a whole syringe without any untoward result. In all the cases in which he has used it—including various forms of malaria, particularly in children, whom it is difficult to get to take quinine in any form—the results have always been “admirable.” The new salt, used hypodermatically, also gives good results in rheumatic affections and in influenza.

Marty <sup>996</sup><sub>Sept. 26, '94</sub> recommends, in preparing solutions of quinine for hypodermatic injection, the employment of basic hydrochlorate, which is better borne than the neutral hydrochlorate and contains 81.71 per cent. of quinine,—a great advantage, though it requires 21 parts of water to dissolve it. The property possessed by antipyrin, of rendering soluble the salts of quinine, can here be utilized. He uses the following formula: Basic hydrochlorate or monohydrochlorate of quinine, 3 grammes (46 grains); antipyrin, 2 grammes (31 grains); distilled water, 6 grammes ( $1\frac{1}{2}$  fluidrachms). This is dissolved by heat, 1 cubic centimetre ( $15\frac{1}{2}$  minims) of the solution containing 0.30 gramme ( $4\frac{1}{2}$  grains) of monohydrochlorate of quinine. This formula is adopted and recommended by the Sanitary Committee of the French Army.

Charles E. Potts <sup>80</sup><sub>Apr., '94</sub> treated two cases of enuresis in children with sulphate of quinine with remarkable success. In order to maintain the cure, however, it is necessary to give large doses for a long time,—1.8 grammes (28 grains) in five doses up to 2.4 grammes (37 grains) daily for a child of 15 years, and 0.48 gramme (7 grains) in four doses up to 1.5 grammes ( $23\frac{1}{4}$  grains) in five doses daily for a child of 10 years. Quinine acts more certainly and more promptly than does belladonna, and is less toxic;

while if untoward symptoms do appear they are less dangerous than those caused by belladonna. Binz recalls the fact that thirty years ago he decided, from experimental researches, that quinine cured malarial fever by a direct action on the cause, represented by inferior organisms; that the nervous system and the circulation were not concerned in this curative action; that once the cause was eliminated from the system the febrile attacks—swelling of the spleen, impoverished condition of the blood, etc.—disappeared of their own accord; and that quinine, as a poison, exercised a far less powerful action upon the human cells than upon the pathogenic agent of malaria. Numerous authors have confirmed this theory since that time, among the more recent being Mannaberg,<sup>2101</sup><sub>'08</sub> who shows the paralyzing action of the drug on the parasites to be apparent a few hours after administration.

Graeser<sup>69</sup><sub>No. 61, '08</sub> believes quinine to have a specific action in influenza. When administered in time and in sufficient dose it will cut short the attack or even prevent its appearance. Fractional doses, however, must not be given, but one massive dose for the entire day, preferably in solution. E. B. Fullerton, of Columbus,<sup>1</sup><sub>Aug. 18, '04</sub> recommends the use of quinine in cholera, 10 grains (0.65 gramme) of the powder in solution, every hour until 20 to 40 grains (1.3 to 2.6 grammes) have been given; afterward as indicated.

*Resorbin.*—Ledermann reported to the Berlin Dermatological Society<sup>742</sup><sub>V. 8, p. 590</sub> <sup>697</sup><sub>July, '04</sub> a base which is capable of traversing the skin after moderate rubbing in, and which leaves a slight covering layer. It is made with some difficulty after a patented method by emulsifying pure almond-oil and a little wax with water and a small percentage of other innocent but necessary vehicles. Resorbin can be mixed with all vegetable and animal fats. It is especially advantageous to add a little lanolin. Its use is indicated in all the hyper- and para-keratoses, as ichthyosis and pityriasis, and in scleroderma, in artificial dermatites, ulcerations, rhagades, scabies. It combines well with Neapolitan ointment. Used as a 33½ per cent. mercurial emulsion the drug is very rapidly absorbed by simply spreading a thin layer over the skin and making slight pressure for a short time. It is free from the unpleasant smell of other mercurial applications, but must be used with care owing to the extreme rapidity with which the drug is absorbed.

*Rubidium Iodide*.—See Iodides.

*Saccharin*.—Capparoni<sup>505</sup><sub>Dec.2,'03</sub> has become convinced that saccharin is a good antiseptic in certain forms of intestinal infection, accompanied by fever of an irregular type and splenic tumefaction, and sometimes closely simulating typhoid fever. Recovery ensues in a few days from the use of saccharin, in doses of 1 gramme (15½ grains) daily for children and 3 grammes (46 grains) for adults. The medicament is said to be well borne, even when used for a relatively long time.

*Salacetol*.—This new salicylic-acid derivative differs from salol in being combined with acetol instead of phenol. Salacetol is produced by heating together mono-chlor-aceton and sodium salicylate. It crystallizes from alcohol or ligroin in scales or fine, glistening needles. It is almost insoluble in cold or hot water, but is readily dissolved in hot alcohol, ether, carbon bisulphide, chloroform, benzol, ligroin, etc. The melting-point is 71° C. (159.8° F.). It has a somewhat bitter taste. Shaking with an alkaline solution, as 0.6-per-cent. caustic soda, resolves it into its component parts. Bourget and Barbey<sup>116</sup><sub>Dec., '03</sub>; <sup>71</sup><sub>May, '04</sub> use it exclusively in the internal treatment of rheumatism, in doses of 2 grammes (31 grains) two or three times daily. They believe that it is especially valuable in pediatrics and an excellent substitute for the salicylic-acid compounds.

*Salicylate of Sodium*.—See Sodium.

*Salicylic Acid*.—H. N. Vineberg<sup>1</sup><sub>June 2,'04</sub> states that salicylic acid and the salicylates are of value in deficient and delayed menstruation. They should not be administered to pregnant women who have a tendency to abort or are metrorrhagic or menorrhagic. In all cases of pregnancy care should be taken in their administration, and on the slightest symptom simulating labors they should be discontinued. Thomas H. Manley<sup>59</sup><sub>Feb. 3,'04</sub> has tried Bourget's suggestion as to the use of salicylic acid as a liniment, rubbed up with sweet-oil, in the treatment of rheumatism, and has found its action to be marvelous in muscular rheumatism, in painful joints, —whether inflamed or not,—in lumbago, sciatica, intercostal neuralgia, and muscular pain of any kind, and also in gonorrhœal rheumatism. Müller<sup>116</sup><sub>Mar., '04</sub> has also found the external application of salicylic acid particularly efficacious in the rheumatic pains of influenza. In the majority of cases, after the use of salicylic acid



and its salts, excessive hyperæmia of the brain, the membrana tympani, and the labyrinth occurs, due to dilatation of the vessels in this region. Schilling<sup>34</sup><sub>No. 40, '93</sub> has been able to prevent these disagreeable effects in most of his cases by the addition of ergotine. Proceeding from this observation he has given salicylic acid as an antidote in a case of ergotine poisoning, with good effect.

*Salipyrin.*—Henning, of Königsberg,<sup>59</sup><sub>Apr. 14, '94</sub> believes this drug to be the best antirheumatic and antineuralgic yet known, and also a most excellent antipyretic, especially in pediatric practice. In cases of rheumatism, when given in the early stages, it is most efficacious in relieving the pain and reducing the swelling of the affected parts. In simple colds and acute coryza it exerts a very favorable influence upon the headache and general malaise. Its action in influenza must be regarded as almost specific. In cases of uterine hæmorrhage not due to the presence of tumors, or occurring in childbirth, salipyrin is much more efficacious than any other known remedy. It is absolutely safe, and gives rise to no unpleasant after-effects. It is best given in the afternoon, in rather large doses, repeated at short intervals. The total daily dose ranges from 0.50 to 8 grammes ( $7\frac{1}{2}$  grains to 2 drachms), according to the age of the patient and the disease. The remedy has no cumulative effect, nor do those taking it acquire a habit. Mosengeil<sup>826</sup><sub>Feb., '94</sub> also recommends it in influenza, the patient being advised not to partake of any food for a couple of hours before the ingestion of the drug.

*Salol.*—Oederer<sup>4</sup><sub>Apr. 9, '94</sub>; <sup>2</sup><sub>May 19</sub> has made a number of experiments with pills coated with salol and containing a small quantity of methylene-blue. For the purposes of coating the salol is gently heated to its melting-point. He shows that the salol covering is impervious to water and is not dissolved at a temperature of 15° to 39° C. (59° to 102.2° F.) by the gastric juice or such other substances as are likely to be present in the stomach. The pills were soluble in various oils in one to two hours and in pancreatic extract in ten hours. One hundred and fifty-two such pills were given to patients and in no case were they found in the stools. In another series of experiments, carried out on himself and a volunteer, the author shows that the salol coating is first dissolved in the duodenum. A coating of 0.02 to 0.03 salol suffices to prevent the pill from being crushed by the pressure of the tongue

against the palate. The pills must not be bitten. They should be kept in a cool place and they should not be taken with substances, such as oil or hot foodstuffs, which are likely to dissolve the coating. An hour after food is the best time for administration. If required in fever they may be given during an intermission, the melting-point of the salol being  $40^{\circ}$  C. ( $104^{\circ}$  F.). Dietrich, <sup>575</sup><sub>No. 50, '93</sub> however, doubts the utility of salol-coated pills, and condemns their use.

Reynier <sup>100</sup><sub>Sept. 19, '93</sub> describes a new use for salol, discovered by his assistant, Isch-Wall, whose method consists in injecting, into suppurating glands, sinuses, or other places, salol fused with iodoform or aristol at a temperature of  $40^{\circ}$  to  $42^{\circ}$  C. ( $104^{\circ}$  to  $107.6^{\circ}$  F.), when they remain liquid fifteen or twenty minutes. These agents act in the cavity as a continuous disinfectant. The injections are contra-indicated in purulent cavities having a narrow orifice, in which the salol, on cooling, would act as a foreign body and be eliminated without having effected the purpose intended. Reynier has used the liquid salol as a dressing in cutaneous sutures, with iodoform. It forms a perfectly-aseptic varnish, thoroughly protecting the wound.

Josias <sup>14</sup><sub>Mar. 18, '94</sub>; <sup>5</sup><sub>June</sub> reported an instance where the administration of 1 gramme ( $15\frac{1}{2}$  grains), followed by 2 grammes (30 grains) on the next day, gave rise to a scarlatiniform erythema, with spots resembling measles and red papules. The urine showed the presence of both phenic and salicylic acids. In discussing the case Dujardin-Beaumetz expressed the belief that one cause for these symptoms was to be found in the renal impermeability which is set up by the ingestion of aromatics, as phenol. Bardet had found that in febrile conditions the aromatics act as antithermics, chilling, cyanosis, and rashes not being uncommon; therefore, in these cases care should be exercised. In non-febrile cases, however, accidents do not occur, even if the doses are large. A proof of this is found in the administration of large doses in dyspepsia. Jasiewicz, from his own experience, could not admit the absorption of this drug when used as a topical application, even in large doses. Dignat <sup>14</sup><sub>June 10, '94</sub> and Patein <sup>14</sup><sub>Apr. 15, '94</sub> report cases in which the drug caused symptoms of renal congestion.

*Salophen*.—Salophen, which, chemically speaking, is the acetyl-paramido-phenol-ether of salicylic acid, has been used

in medicine for more than two years, chiefly in cases of acute rheumatism and neuralgia in adults, and is strongly recommended by Richard Drews, of Hamburg,<sup>297</sup><sup>6</sup> not only for these affections occurring in childhood, but as an antipyretic in scarlet fever, typhoid fever, pneumonia, tuberculosis, and in the restlessness and headache accompanying the commencement of some sore throats. He treated fifteen cases of acute rheumatism in children from 7 to 14 years of age with salophen, ordering from 0.30 to 0.50 gramme ( $4\frac{1}{2}$  to  $7\frac{3}{4}$  grains) every two hours, or from 3 to 5 grammes ( $\frac{3}{4}$  to  $1\frac{1}{4}$  drachms) daily. In no case was any effect on the heart produced. Generally the pain was alleviated on the first day and completely arrested in three or four days, the temperature falling to normal and the swelling of the joints disappearing about the same time. In twelve of the fifteen cases profuse perspiration was produced half an hour after the medicine was taken, but this did not exert any unpleasant effect on the general condition, and there was never any giddiness, singing in the ears, nausea, or gastric disturbance. The inflammation never passed from one joint to another, though in two cases the swelling re-appeared in three or four days in the joints which had been affected. Here a continuance of the salophen caused the symptoms to vanish in three days. The drug was also used successfully in five cases of muscular rheumatism of the neck; also in a case of purpura rheumatica in a girl 14 years of age, where there were large purple spots on various parts of the body, and the knees and ankles were swollen and painful; there were also complete loss of appetite, great lassitude, and continuous pyrexia. The day before the attack the girl had sat in school in wet clothes. The limbs were enveloped in cotton-wool, and 0.50 gramme ( $7\frac{1}{2}$  grains) of salophen was given every two hours to the extent of 5 grammes (75 grains) per diem. On the fourth day the temperature had become normal, and the spots had become lighter in color and less tender to the touch, though a few additional smaller ones had made their appearance. In nine days all the pain, œdema, and spots had disappeared, and three days later the patient was allowed to get up. Again, similar treatment cured another girl 13 years of age who suffered from rheumatic chorea, complicated with a slight systolic apex-bruit which, together with the chorea, disappeared in twelve days. In five cases of migraine in children,

where no cause such as worms or cerebral tubercle could be made out, two or three doses relieved the headache and enabled the children to return to their school-work. In toothache, too, of rheumatic origin, 0.50 gramme ( $7\frac{1}{2}$  grains) of salophen effected a complete cure. It was found that the children made no objection to taking salophen in the form of powder washed down with water or suspended in a tablespoonful of water.

A. Köster <sup>372</sup><sub>V.20, Nos.1,2</sub> tried the drug in thirty cases of acute articular rheumatism, the results in general being very satisfactory. The remedy proved efficacious in acute muscular rheumatism, and also in neuralgia. As an antipyretic, however, it is not of striking value. Köster prescribes the drug in doses of 4 to 6 grammes (1 to  $1\frac{1}{2}$  drachms) daily, in powder, 1 gramme ( $15\frac{1}{2}$  grains) to the dose.

Ciullini and Viti <sup>2102</sup><sub>Nos.2,3,'94</sub> also recommend salophen as superior to salicylic acid in rheumatism, and Rosenheim <sup>760</sup><sub>Oct.6,'94</sub> reports good results from its use in this affection, as well as in acute tonsillitis. W. A. Galloway <sup>71</sup><sub>Apr.,'94</sub> calls attention to its value in septic infection. He treated four such cases with 5 grains (0.32 gramme) of salophen every four hours, the disease yielding within four days to the action of the drug.

*Salubrin*.—Seve and Ribbing <sup>678</sup><sub>V.18, No.13</sub> have made numerous experiments with salubrin (Hakansson), and have found it an excellent antiseptic for wounds of various kinds. They treated successfully contusions and serious injuries of the hands from machines, burns of the first and second degrees, frost-bites, fissures, and ulcerations. In certain cases of eczema and other dermatoses it was also found useful, as well as in diphtheria, applied as a lotion or disinfectant. The authors, however, do not regard it as a specific in the latter disease.

*Saprol*.—Scheurlen <sup>324</sup><sub>B.4., '03</sub> <sup>2</sup><sub>Mar.3,'94</sub> states that, of all disinfectants advocated for rendering infected stools and cess-pools innocuous, saprol most nearly answers all requirements. It forms no inefficacious compound on admixture, and readily diffuses itself among the excreta. Lime and crude carbolic acid have hitherto been the two principal agents employed, but the disadvantage of the former is that it is apt to descend to the bottom of the receptacle without having achieved its object, and admixture is impossible, owing to the poisonous gases which arise. As regards cresol, it is not



sufficiently destructive to germs. Sapol, on the other hand, is readily soluble in water, a solution being possible which contains 2.18 per cent. of cresol. However, even a 0.4-per-cent. solution suffices for all practical purposes. In order to prepare a 0.4-per-cent. solution, 1 part of sapol should be added to 80 of water, when during twenty-four hours the strength will gradually increase. A column of liquid is thereby rendered sterile in six to twenty-four hours, and bacteria added at the end of that period are destroyed in one hour.

*Scopolamine*.—E. Bock <sup>283</sup><sub>May, '94</sub> tried hydrobromate of scopolamine in 200 cases of ocular disease, obtaining good results in 183 cases. In 4 cases it was necessary to discontinue its use, either on account of increased intra-ocular tension or from vasomotor paralysis in the anterior segment of the globe. Both these symptoms were due to the use of a too strong solution. The author considers the remedy indicated in serofulous conjunctivitis, ulceration, herpes of the cornea, and iritis. It was ineffectual in granular conjunctivitis and pannus, but of great service in corneal suppuration and interstitial keratitis. Lobanoff <sup>586</sup><sub>No. 32, '94</sub> also tested the drug, finding that in solutions of 1 to 100, 1 to 500, and 1 to 1000 it produced mydriasis and paralysis of accommodation more rapidly than did atropine, but that its effects were more transient. He believes that it should be preferred when mydriasis is required for purposes of diagnosis, 1 to 5000 being sufficient; for affections of the eye a solution of 1 to 500 is to be preferred. Experiments made with a 1 to 100 solution showed that scopolamine was not only better absorbed than atropine, but also that it facilitated the absorption of other substances in the anterior chamber. In one case predisposed to glaucoma the drug did not prevent increased intra-ocular pressure, while in the eyes of seven healthy subjects it had no influence on intra-ocular pressure. In the treatment of affections of the cornea and iris it is inferior to atropine, its effect decreasing after the first day of its use, and its antiphlogistic and antineuralgic action becoming less marked. It is to be preferred to atropine only in cases of catarrh following the prolonged use of that drug, or where an idiosyncrasy exists. Illeg's conclusions <sup>34</sup><sub>p. 617, '93</sub> are practically identical. Bokenham <sup>2</sup><sub>Sept. 16, '94</sub> found that, like atropine, it completely paralyzes the ciliary muscle. The paralysis of accommodation persists for about a day and a half. No untoward effects

were noted, and a dose equal to an amount of atropine which would paralyze completely the inhibitory power of the vagus produced only slight acceleration of the pulse. It was further observed that a solution of  $\frac{1}{4}$  per cent. had quite as complete an action on the pupil as a 1-per-cent. solution of atropine, but without the production of increased tension of the eyeball. Harvey Smith <sup>July 21, '94</sup> formulates the following conclusions regarding the drug: The toxic effect of scopolamine used in  $\frac{1}{10}$ - and  $\frac{1}{5}$ -per-cent. solutions is easily produced, but can readily be avoided if the lids be everted or the nasal ducts compressed at the time of instillation. In diseased conditions of the eye it is quite as useful a drug as atropine. In refraction work complete and thorough paralysis of accommodation with the maximum of mydriasis can be produced in from twenty minutes to half an hour, where the drug is used *coup sur coup*, the duration of its effect being from five to eight days. Its greatest value lies in the rapidity of its action, which renders it specially useful for purposes of examination in refraction cases and in diseased conditions of the interior of the eye. Hobbs <sup>207 Sept., '94</sup> has used it for refractive tests, finding it as satisfactory as atropine.

*Senecio Vulgaris*.—Murrell <sup>3 No. 14, '94</sup> regards senecio vulgaris as a valuable remedy in amenorrhœa, especially when due to cold or occurring after confinement. He administers the tincture in doses of 1 to 2 fluidrachms (4 to 8 cubic centimetres) three or four times daily, or the fluid extract in doses of 20 drops three or four times daily. The drug does not disturb digestion or produce any other untoward effect. It has also been useful in increasing the menstrual flow when scanty, and in relieving dysmenorrhœa and the headache attending menstruation.

*Serum Therapy*.—See Animal Extracts.

*Silver Nitrate*.—J. Berruero, of Madrid, <sup>673 May, '94</sup> recommends that when an hydatid cyst contains a clear and transparent fluid about a third or less of the contents of the sac should be removed and an injection be made of a solution of nitrate of silver 1 to 5 per cent., the quantity being about equal to the amount of fluid evacuated. The nitrate of silver, by precipitating the chloride of sodium contained in the cystic fluid, modifies it and acts probably as a parasiticide; in any case, it favors absorption of the fluid, which disappears within twenty-four hours.

*Sodium*.—Liégois<sup>69</sup><sub>No.10, '94</sub> emphasizes the value of sodium benzoate in large doses in the treatment of inflammatory affections of the pharynx. Under this mode of treatment pain and difficulty in swallowing subsided in the course of a few days. Children were given a total dosage of 5 grammes (75 grains) daily; adults received from 10 to 15 grammes ( $2\frac{1}{2}$  to  $3\frac{3}{4}$  drachms). The drug proved equally efficacious in the treatment of laryngitis and bronchitis, while it failed entirely in diphtheria, both applied topically and administered internally. In combination with tannic acid the drug was found to be useful in the treatment of chronic nephritis:  $\mathcal{R}$  Sodium benzoate, tannin, each 5 grammes ( $1\frac{1}{4}$  drachms); extract of gentian, enough to make 100 pills. Sig.: Two pills thrice daily. Given in small doses in cases of uric-acid formation, sodium benzoate converts the insoluble urates into hippuric acid, and this is readily eliminated by the urine. Sodium benzoate is considered an excellent cholagogue, and may be given in the following combination:  $\mathcal{R}$  Sodium benzoate, sodium salicylate, powdered rhubarb, each 6 grammes ( $1\frac{1}{2}$  drachms); pulverized nux vomica, 2 grammes ( $\frac{1}{2}$  drachm). Ft. pil. no. xx. Sig.: One pill twice daily.

Bicarbonate of sodium has been studied by Azarevitch and Leplinsky, of Tchüdnovsky's clinics in St. Petersburg,<sup>2050 109</sup><sub>Nos.2,48,'94; Sept.</sub> who carried out a set of elaborate experiments on thirteen healthy men (including themselves) aged from 19 to 35 years. In each instance the observations lasted for fourteen consecutive days, and were divided into two equally long stages during one of which the subject was daily receiving 5 grammes ( $1\frac{1}{4}$  drachms) of chemically pure bicarbonate of sodium in powder. Half of the daily dose was ingested an hour before and the other half three or four hours after the dinner. On each occasion 50 cubic centimetres ( $1\frac{1}{2}$  ounces) of water were swallowed immediately after taking the powder. The dietary always consisted of fresh meat, milk, butter, half-white bread, tea with sugar, and salt. The chief outcome of the research may be condensed as follows: 1. Under the influence of the bicarbonate in the said doses the assimilation of food-nitrogen slightly improves. 2. The nitrogenous metabolism somewhat decreases. 3. Oxidation processes of systemic proteids become more complete. 4. The assimilation of food-fats remains unaltered. 5. The same holds true with regard to the proportion

of water in fæces, the daily quantity and specific gravity of urine, and the cutaneous and pulmonary ( $\text{CO}_2\text{K}_2\text{O}$ ) losses. 6. The acidity of urine usually decreases (the reaction sometimes even becomes alkaline). The bodily weight, apparently, tends to slightly increase.

Rosenbach <sup>34</sup><sub>No.3,'94</sub> finds bicarbonate of sodium of direct utility in cases where overeating at a single meal has caused marked hyperacidity and where it is impossible to make the patient vomit or to wash out the stomach. Such cases are, however, rare,—much rarer than cases in which the drug is used to excess and in too large doses. According to this author, only small doses should be used, under the surveillance of the physician, and it should never be given to anæmic patients with gastro-intestinal hyperæsthesia or subjects with chronic gastric catarrh. Patin <sup>212</sup><sub>June 10,'94</sub> reports two cases of cystitis and hæmaturia following the use of large doses of bicarbonate of sodium.

Chlorate of sodium, more soluble and less toxic than chlorate of potassium, has been used by Barrat <sup>195</sup><sub>Aug.,'94</sub> as a potion in a case of cancer of the stomach, in doses of 10 grammes ( $2\frac{1}{2}$  drachms) daily; in interstitial injections of an aqueous solution in a case of epithelioma of the upper lip, 1 cubic centimetre ( $15\frac{1}{2}$  minims) being injected every two days; as a potion (8 grammes to 200 grammes—2 drachms to  $6\frac{1}{2}$  fluidounces—of water) in three cases of laryngeal diphtheria, a teaspoonful hourly being given. All the cases recovered.

Chloride of sodium was used successfully by H. Dubief and A. Bolognesi <sup>67</sup><sub>Aug.30,'94</sub> in a case of tubercular empyema. The patient had a marked history of alcoholism. As a consequence of a previous pleurisy, a purulent and tubercular empyema was developed which necessitated pleurotomy. After the operation was performed the pleural cavity was repeatedly washed with the salt solution, with the result that a complete cure was effected in the course of two months, not even a trace of a fistulous opening having remained. The salt solution employed was made up as follows: Chloride of sodium, 20 grammes (5 drachms); sulphate of sodium, 1 gramme ( $15\frac{1}{2}$  grains); distilled water, 1 litre (1 quart). The washings were well tolerated and during their use the patient remained apyretic, felt well, and had a good appetite; the kidneys operated normally, and the bodily weight increased.



J. Ruhemann <sup>116</sup><sub>Apr., May, '94</sub>; <sup>814</sup><sub>June 1</sub> formulates the following conclusions as to the value of sodium iodate: The drug can be applied with success, in the pure form, in ulcerations, nasal catarrh, and laryngitis. In ear diseases 1 to 5 dilutions with boric acid are indicated, for wounds 1 to 10, and for the eye-solutions 1 to 10 or 20 parts of water. It is also of service, given internally, in scrofulous affections, glandular swellings, bronchial asthma, etc. Subcutaneous injections of 0.05 to 0.20 gramme ( $\frac{1}{2}$  to 3 grains) cause the resolution of glandular swellings, rheumatic pains, acute and chronic neuralgias, neuritis, etc. As much as 15 grammes ( $\frac{1}{2}$  ounce) in all may be injected in any one case. Internally 1 gramme ( $15\frac{1}{2}$  grains) may be administered daily, in pills containing 0.15 gramme ( $2\frac{1}{4}$  grains) each, one or two to be taken three times a day. The aqueous solutions should be given in milk after meals. Children bear the remedy quite well. Its use, even for weeks, has no injurious effect on appetite and digestion. Its action is very beneficial in chronic bronchial asthma.

Naphtholate of sodium, the product of the action of sodium hydrate upon beta-naphthol, is, according to Cozzolino, <sup>37</sup><sub>Nov., '93</sub>; <sup>80</sup><sub>May, '94</sub> one of the most valuable antiseptic and curative medicaments for the control of suppurative processes. It is odorless, unaltered by contact with instruments or tissues, and soluble in water in the proportion of 1 to 3, forming a brownish solution when strong, but is alkaline in reaction and nearly colorless and tasteless in the usual 3- to 4-per-cent. solution. The powder should be kept from the light, but the solutions demand no precautions. Experience in other medical fields has shown the 3-per-cent. solution to be as efficacious as 1 to 2000 sublimate solutions, and in the ear Cozzolino has found it twice as prompt in ending suppuration as boric solutions, using it by irrigation to secure full washing away of all discharge. In the nose he employs it in a 0.5- to 2-per-cent. solution or in a weak ointment, and claims brilliant results for it here as well as in tonsillar troubles. De Rossi <sup>37</sup><sub>May, '94</sub> also recommends a 4 or 5 per 1000 solution as an efficient microbicide. Many authors, among them Ebstein and Müller, have had good results from the use in diabetes of salicylate of sodium in large doses (from 5 to 15 grammes— $1\frac{1}{4}$  to  $3\frac{3}{4}$  drachms—daily). Senator <sup>116</sup><sub>May, '94</sub> believes that it is especially indicated when the disease is of recent date; but the action of the drug is uncertain and only temporary results are obtained even

from its prolonged use. In one case treated by Michaelis<sup>116</sup>  
May, '94 the patient took from 8 to 10 grammes (2 to  $2\frac{1}{2}$  drachms) daily for two months, in all about 500 grammes (16 ounces) of the drug; but the sugar re-appeared in the urine as soon as treatment was suspended, while symptoms of salicylic intoxication also appeared, as might have been expected.

Sulphide of sodium, according to Peyrou,<sup>121</sup>  
Feb., '94 acts very well in the treatment of lead poisoning, given in the dose of from 0.30 to 0.50 gramme a day ( $4\frac{1}{2}$  to  $7\frac{3}{4}$  grains). He had poisoned animals with carbonate of lead, and then administered sulphide of sodium, with the result that they were more rapidly cured than were the animals of control experiments. Quinquaud, in the discussion, confirmed the statement. In lead poisoning he had given the monosulphide of sodium in the dose of from 0.50 to 1.0 gramme ( $7\frac{3}{4}$  to  $15\frac{1}{2}$  grains) daily, and observed an increased elimination of lead in the urine. The effect is the same in the case of mercury, which is eliminated in much greater quantity under the influence of this drug, which must be regarded as an excellent evacuant in all cases of metallic poisoning.

Sulphocarbolate of sodium is recommended by Sansom<sup>6</sup>  
June 2, '94 in purpura hæmorrhagica. He describes the case of a girl, aged 12, admitted into the London Hospital on November 15, 1893, in an extremely feeble and critical condition. Extravasations of blood were seen about the eyelids; there was much oozing of blood from the mouth; hæmorrhagic stains and spots were observed on the skin covering the chest, abdomen, and back, as well as the upper and lower extremities. Bullæ (as of pemphigus) containing deeply blood-stained fluid were upon the left ala nasi, over the abdomen, the arms, and the legs. The tongue, generally stained darkly, presented several small bullæ over its dorsum and sides; similar blebs were seen within the lips, all containing blood-stained fluid, some bursting and liberating their contents to produce oozing from the mouth. There was vomiting, the vomit being blood-stained, and much blood was voided with the evacuations. The urine contained a trace of blood. The pulse was 124 and the respirations 34 per minute; there was cough, with deeply blood-stained sputa; bronchitic râles were heard on the chest and over the front and base of the right lung. The temperature on admission was 98.8° F. (37.1° C.), but rose on the day following to

103.8° F. (39.9° C.). Half-drachm (2 grammes) doses of sodium sulphocarbolate were administered every four hours. During the next five days the patient was in a very critical condition, the signs being little changed. After nine days, although there were indications of some general improvement, hæmorrhagic extravasations were observed on each fundus oculi, with signs of double optic neuritis. There was, however, continuous amendment, though the temperature rose on one day to 105° F. (40.6° C.) and on the next to 104° F. (40° C.). All the morbid signs passed away, and the patient was discharged quite well after having been in the hospital for thirty-six days. In another well-marked case the administration of sodium sulphocarbolate in half-drachm (2 grammes) doses every four hours for a protracted period had been practiced, and the patient completely recovered.

*Sozoiodol.*—Teichmann<sup>116</sup><sub>Apr., '04</sub> warmly recommends the salts of sozoiodol in therapeutics. He has used the potassic salt almost exclusively in diseases of the ear as a desiccative agent, and has had excellent results in the treatment of diffuse inflammations of the external auditory meatus with abundant secretion, and in purulent otitis media with perforation of the tympanum. Sozoiodol is contra-indicated in acute otitis media with slight tympanic perforation, while sodic sozoiodol may be substituted for the potassic salt in very sensitive patients, though, being more soluble, its desiccative action is less pronounced. Potassic sozoiodol is to be especially recommended in simple chronic hypertrophic rhinitis, and it is an excellent substitute for iodoform in the post-operative treatment of affections of the nasal cavities and the pharynx. The inflammatory phenomena are but slight, even after the use of the galvano-cautery, the remedy acting in these cases as an antiseptic.

W. Goldzieher<sup>169</sup><sub>Aug., '04</sub> has used with good results, in ulcerations of the cornea not sufficiently extensive for surgical measures, the following ointment: Sodic sozoiodol, 0.25 to 0.50 gramme (4 to 7½ grains); sulphate of atropine, 0.05 gramme (⅞ grain); vaselin, 10 grammes (2½ drachms). To be carefully and thoroughly mixed and applied from one to three times daily. Pilocarpine or other appropriate substance may be added, if necessary. The ointment is also of value in parenchymatous or punctate keratitis. (See Mercury for mercuric sozoiodol.)

*Sparteine*.—P. Langlois and Maurange<sup>296 Aug. 8, '94; 80 Nov.</sup> call attention to the fact that sparteine, associated with morphine, is a powerful stimulant to the heart during chloroformization. The authors first experimented upon rabbits and dogs. Chloroform was administered to these animals while under the influence of sparteine, and, although the anæsthetic caused an arrest of respiration, the heart, disturbed at first, rapidly resumed its normal rhythm. In the dog the arterial pressure remained high even during a profound chloroform narcosis. Sparteine was then tried in the human being. A dose of from 0.03 to 0.04 gramme ( $\frac{1}{2}$  to  $\frac{2}{3}$  grain), associated with 0.01 gramme ( $\frac{1}{6}$  grain) of morphine, was injected hypodermatically fifteen minutes before the administration of chloroform in various long surgical operations, such as laparotomy, hernia, etc. In one hundred and twenty observations made the heart continued to act strongly and in a perfectly-regular manner during the chloroform narcosis.

Cerna<sup>1 May 20, '94</sup> concludes, from his own experience and from a careful review of the literature of the subject, that sparteine is a medicament of considerable power as a cardiac and renal stimulant, second only to digitalis. The drug does not produce, as a general rule, any serious after-effects. It is best given by itself, though it may be advisable sometimes to administer it in combination with other remedies. I. E. Bacon<sup>71 Mar. 15, '94</sup> has had good results from its use in cardiac affections. He gives small doses every few hours.

*Spermin*.—See Animal Extracts.

*Strontium*.—Adolf Ried<sup>8 Nos. 16, 17, '94; 99 Aug. 2</sup> reports a series of cases of severe albuminuria treated with strontium salts in Drasche's clinic at Vienna. The experiments of Constantin Paul and Dujardin-Beaumetz have shown the salts of strontium to have a marked influence upon the albuminuria of renal disease, but have not pointed to any special diuretic action from the drug. The cases reported were due to various causes, and all received a mixed diet while under treatment. The lactate of strontium was used in all instances. An increase in the amount of urine was noticed, especially in cases of Bright's disease with scanty urine and anasarca. The increase in the urine was often rapid, while the diminution of dropsy, though slower, was continuous. The action on the amount of albumin was less regular, but in one instance there



was a diminution from 6 per cent. to 1 per cent. within a week; and in another, from 8 per cent. to  $1\frac{1}{2}$  per cent. in seventeen days. The following conclusions were reached: 1. Lactate of strontium reduces the amount of albumin in the urine to a noticeable degree in many cases of Bright's disease, but has no such effect on contracted kidneys. 2. The manner of action is not certain. Dujardin-Beaumetz's theory, of its exerting a favorable action on the digestion and so reducing the toxin formation, cannot be accepted, as the exhibition of the drug in powder form apparently interfered with digestion, causing distress and vomiting. The best form of administering it appears to be in the following solution:  $\mathcal{R}$  Strontium lactate, 25.00; water, 150.00.  $\mathcal{M}$ . Sig.: A teaspoonful three or four times a day. 3. The use of the drug in the above dose has a decided diuretic action. Like any other diuretic drug it may fail in single cases. 4. On account of its diuretic action lactate of strontium is recommended in pleuritic effusion as a substitute and alternate for salicyl, since it can be given for long periods without any ill effects.

*Strychnine.* — Delezenne <sup>410</sup><sub>No. 4, '94</sub> <sup>5</sup><sub>Dec., '94</sub> recalls the observation of Wertheimer that, at the moment when the arterial pressure rises under the influence of a strychnine injection, an intense redness invades the mucous membranes of the lips and tongue. From a series of observations upon temperature, venous pressure, and from a consideration of the literature, it is probable that the peripheral arterioles do not share in the constriction which affects the deep vessels. Evidently, then, strychnine is an energetic dilator of the peripheral vascular net-work, and, if its action upon the whole of the vasomotor system be taken into account, it appears to be identical with that of asphyxia and of excitation of sensory nerves. T. J. Mays, of Philadelphia, <sup>144</sup><sub>Nov., '98</sub> believes that strychnine has a more powerful stimulating influence over the nervous system than any other drug in the materia medica. He gives it in large doses, varying from  $\frac{1}{30}$  to  $\frac{1}{6}$  grain (0.002 to 0.01 gramme) four times a day,—in some cases, as in asthma, pushing it until there is an approach to the production of the toxic effects of the drug. Besides proving very beneficial in asthma, he finds it one of the most useful agents in treating acute pneumonia, whether of the croupous or catarrhal variety. Further, he knows of no disease more eminently benefited by strychnine than pulmonary consump-

tion. He recommends it in all cases of cardiac or pulmonary disease where there is danger of collapse. J. H. Duncan, of Chatham, Ont., <sup>39</sup> June, '94 reported marked benefit from the use of  $\frac{1}{30}$  grain (0.002 gramme) every three hours, in pneumonia. Gaviller <sup>39</sup> June, '94 has found the remedy of value in the bronchitis of children. In one case of chronic bronchitis in an adult he used it until tetanic spasms occurred. Clifton Mayfield, of Washington, <sup>81</sup> Jan., '94 praises its effect upon the chronic alcoholic. Appetite is restored, sleep is induced, and the various nervous symptoms lessened even where a moderate indulgence is continued. In many cases of neuralgia, more especially in anæmic individuals, he has found that it will not only relieve, but absolutely cure. In convalescence from acute fevers it is the typical tonic, improving digestion and assimilation, and strengthening the heart's action. W. B. Breed <sup>9</sup> Apr. 7, '94 treated seven cases of acute and chronic alcoholism by means of subcutaneous injections of nitrate of strychnine, in doses of 0.003 to 0.006 gramme ( $\frac{1}{22}$  to  $\frac{1}{11}$  grain) daily or oftener, as indicated by the gravity of the case. The desire for drink disappeared on the third day, being succeeded by a dislike for liquor, the moral conditions appearing to be entirely changed. C. C. Hubbard <sup>1063</sup> Mar., '94 also praises its use in alcoholism and in the tobacco habit.

Kœnigsdörfer <sup>209</sup> No. 7, '94 has used it as an antidote in mushroom poisoning, injecting 0.001 gramme ( $\frac{1}{64}$  grain), twelve such injections causing complete recovery.

*Sugar.*—Bossi, of Genoa, <sup>505</sup> No. 10, '94; <sup>49</sup> Aug. has made a practical application of an hypothesis enunciated by two Italian physicians, Paoletti and Mosso, to the effect that sugar, administered internally, might have a stimulating action on uterine muscle, as it has on voluntary muscles. Bossi tried it in eleven cases, giving 1 ounce (31 grammes) of sugar in about 8 ounces (250 cubic centimetres) of water. In ten cases the effect was excellent. The ecboic action showed itself in from twenty-five to forty minutes, and, in most cases, lasted till the birth of the child. In other cases a second dose had to be given. The contractions were always quite regular, and free from any tetanic tendency.

*Sulphanilic Acid.*—According to Valentin, <sup>296</sup> Nov. 24, '94 sulphanilic, or paranalinosulphonic, acid is an excellent remedy in acute catarrh. From 30 to 60 grains (2 to 4 grammes) may be prescribed with a somewhat smaller quantity of bicarbonate of soda in ten times its

weight of distilled water, once or twice daily. The effect of a dose becomes apparent in about two hours, and the amelioration it produces may be expected to continue for a whole day or even more. When sulphanilic acid is taken for some weeks it does not appear to disorder the digestion or to produce any unpleasant effect except, perhaps, slight diarrhœa.

*Sulphites*.—Joseph Jones, of New Orleans, <sup>61</sup><sub>Feb. 3, '94</sub> publishes a study on the sulphites and hyposulphites, arriving at the following conclusions: 1. That these salts exercise upon the economy a very marked action,—an action almost specific in certain cases. 2. That they not only retard death, but alleviate the symptoms of purulent infection from the introduction of pus into the circulatory system or of blood rendered putrid by divers poisons, effecting cure in a marked number of such cases. Purulent infection, purulent diathesis and metastasis, phlebitis, pyæmia, putrid infection, and puerperal fever form a group of septic diseases with a special character and a grave prognosis. The indications can be much better met and success becomes much more certain with the sulphites than with any other remedy.

*Sulphonol*.—Schaumann <sup>116</sup><sub>Aug., '94</sub> finds that this drug exercises no influence on nutrition, the destruction of albumin remaining perfectly normal during its administration. It is therefore superior in this respect to chloral hydrate, to say nothing of the injurious effect of the latter drug upon the heart and vessels. H. Schedtler submitted <sup>295</sup><sub>H. 3, 4, '94</sub> forty-one female patients suffering from mental diseases to continuous treatment by sulphonol. Daily doses of 1 to 2 grammes (15½ to 31 grains) caused no untoward symptoms, even when continued for a long time without interruption. On the contrary, daily doses of 3 grammes (46 grains) gave rise to vomiting, diarrhœa, slight albuminuria, and a sulphurous taste in the mouth in one case and to a dark-red exanthem, followed by vomiting, diarrhœa, unconsciousness, headache, vertigo, and palpitation in another. It is therefore desirable to interrupt the use of the drug from time to time, if doses of 3 grammes (46 grains) become necessary. In most of the author's cases 1 to 2 grammes (15½ to 31 grains) in twenty-four hours were sufficient to produce sleep or to calm excitement, especially in cases of melancholia with anxiety.

A. Grannelli, of Rome, <sup>589</sup><sub>Mar. 19, '94</sub> has studied the accidents following

the use of sulphonals, and, according to him, no other remedy is so dangerous. He urges the greatest prudence in its employment, believing that while it may be useful in some cases it has a negative value in many others and is, besides, distinctly injurious. Stern<sup>84</sup> <sup>866</sup><sub>No.10,'94; June</sub> reports the case of a woman of 70, who died of sulphonals poisoning. She had taken about 150 grammes ( $4\frac{3}{4}$  ounces) in the course of five months, but with occasional intervals. The clinical picture was the usual one of stupor, deepening into coma, constipation, mental confusion, weakness, and hæmatoporpyrinuria. Macroscopically, no cause could be discovered for the lethal termination. Microscopical examination of the kidneys showed extensive cell-necrosis in the convoluted tubules and the ascending limbs of Henle's loops. The glomeruli contained fibrinous and blood coagula. The vessels of the renal cortex were engorged, the arteries showing thickened walls. The author thinks there is no doubt that this toxic nephritis was due to the sulphonals. Herting<sup>295</sup> <sup>90</sup><sub>B.51,H.1,'94; Dec.</sub> adds three cases in which sulphonals produced toxic effects. In the first case, that of a woman 53 years of age, the evil effects were first seen after she had taken 128 grammes ( $4\frac{1}{8}$  ounces) in one hundred and ten days. She was then found to suffer from heaviness in the limbs, slight hebetude, and stammering speech. After a decrease of the dose from 2 grammes (31 grains) to 0.50 gramme ( $7\frac{3}{4}$  grains) and three days' rest in bed these symptoms disappeared. Six days later the dose had to be raised to 2 grammes (31 grains), and in ten days staggering and incapacity for walking came on. The sulphonals was then discontinued. Next day the temperature rose to 39.3° C. (102.6° F.) and the urine became of a red or cherry color. Vomiting, loss of appetite, pain in the hypochondria, and constipation alternating with diarrhœa now appeared; she gradually became weaker and a fatal result followed. At the post-mortem nothing special could be found. The second case was that of a patient aged 59, who in four hundred and two days, including an interval of forty-five, had taken 388 grammes ( $12\frac{1}{2}$  ounces) of sulphonals. The first symptoms of poisoning were indicated by the dark-colored urine and slight lessening of the appetite. After the drug was discontinued these symptoms soon disappeared. The third case was that of a patient aged 34, who took 379 grammes ( $12\frac{1}{4}$  ounces) of sulphonals in two hundred and forty-five days. The



drug produced slight gastric symptoms and dark-colored urine, which, with rest, wine, and a strengthening fluid diet, soon disappeared. The spectroscopical examination of the urine confirmed Quincke's statement that the coloring of the urine is not due to hæmatoporphyrin, but to some yet unknown coloring material.

*Tannigen*.—Meyer<sup>69</sup><sub>No. 31, '94</sub><sup>112</sup><sub>Dec.</sub> calls attention to the inefficiency of most astringents upon the lower bowel because of their destruction in the stomach or upper bowel, the large dose in which they must consequently be exhibited, and the deleterious effect of this large dose upon the stomach itself. The new compound which he recommends is a pentacetate of tannin. It occurs in yellowish-gray powder, is tasteless and odorless, and is slightly hygroscopical. It can be heated to 330° F. (165.5° C.), without change. It is insoluble in cold water and only slightly soluble in hot water. The action of this drug was first tried on cats. It was found that relatively large doses could be taken without interfering with the stomach in any way, and that it had a decidedly constipating effect.

Müller<sup>69</sup><sub>Aug. 2, '94</sub> tested tannigen on some of his patients, with the following results: The patients take the powder without any ill effects either upon the appetite or the stomach. The drug was so harmless that a definite dose was not ordered, but a knife-pointful was directed three to eight times daily. It was used in chronic diarrhœa, chronic intestinal catarrh, recurrent dysentery, and intestinal disturbance in phthisical patients. In most cases the number of stools was decreased on the day after the drug was begun. In some, as in phthisical cases, the good results ceased when the drug was discontinued, but as soon as it was again administered the diarrhœa stopped. Some of the patients took it for several weeks without ill effects or lessening of the good effects. The drug was also tried in a small epidemic of acute diarrhœa, and the disease in all the cases was brought quickly to an end. In the acute and subacute diarrhœas of children the drug is valueless unless the diet be changed. It is also without good effect in the atrophic cases of nursing infants. He concludes that it is of most value in chronic diarrhœa, being actually curative in these cases. It is also of great value in the diarrhœa of phthisical patients, where it can be given for a long time and will not interfere with the appetite or digestion.

*Tar.*—Stern <sup>116</sup> <sub>Aug., '93</sub> <sup>2</sup> <sub>Sept. 30</sub> refers to the difficulty which has hitherto been experienced in producing a non-irritating tarry preparation. Spirit, oil, etc., have been added for this purpose, but with indifferent success. The author has, however, observed that if pix liquida or any other kind of tar be allowed to stand for several weeks in a warm place it separates into two layers, the upper being thin and syrupy, the lower and smaller being thick and often mixed with small solid particles. Each portion is differently affected by spirit; neither appears to be dissolved, but each has a constant and unvarying action, the spirituous mixture prepared with the lower strata being very irritating, while the other is always well borne. The author therefore recommends the use of the upper layer only, which should be mixed with an equal quantity of spirit.

Pixol is a pine-tar treated by soft potassium soap and caustic potash, which render it soluble in water. Doukalsky <sup>3</sup> <sub>Sept., '94</sub> states that an aqueous solution of 10 to 13 per cent., applied two or three times daily, is an excellent remedy for acute dermatitis due to the too energetic use of ointments in scabies, of mercurial friction, and other medication of the kind. The itching disappears almost immediately and the inflammation within several days. It is also of value in psoriasis, soft chancres, and wounds following the opening of buboes.

Leo Leistikow <sup>28</sup> <sub>No. 8, '94</sub> <sup>2</sup> <sub>Dec. 1</sub> prefers coal-tar to any other species of tar in the treatment of disease of the skin, and has used it for many years. He has found the following tincture unobjectionable:  $\mathcal{R}$  Ol. lithanthracis, 3 parts; spiritus (95° C.), 2 parts; ether. sulphuric., 1 part. When applied to the skin with a brush this dries quickly and can easily be removed, when required, by means of a little olive-oil. Leistikow has used this tincture in two hundred cases and has seen tar folliculitis only twelve times and tar poisoning (evidenced by deep-black discoloration of the urine) twice. The effect was, in the majority of cases, very satisfactory. The tincture was a much more powerful antipruritic than other preparations of tar, more energetic, more penetrating, and more lasting in its effect; so that relapse was less common. It is not, however, adapted for cases in which the whole skin is involved; in these it should be applied only to the worst places. The tincture is indicated: 1. In dry forms of eczema of the hairy scalp,

breast, belly, back, nuchal region, genitals, extremities, and navel; on the face, as it is apt to cause tar erythema, it should not be used on patients who are going about. 2. In psoriasis, especially in patches on the scalp, elbow, and knee; here a combination of it with 2-per-cent. chrysarobin is of special advantage. 3. In Hebra's prurigo. 4. In trichophytic affections.

Lacruz<sup>632</sup><sub>Apr.7,'94</sub> warmly recommends tar in the treatment of hæmorrhoids, in which affection it has long been regarded as a popular remedy. He uses the following ointment: Tar, extract of belladonna, each 3 grammes (46 minims); glycerin, 30 grammes (1 fluidounce). Apply locally morning and evening. He reports five cases in which cure was thus effected in from four to twelve days.

*Tartar Emetic.*—According to Jaccoud<sup>67</sup><sub>v.126,p.31</sub> tartar emetic is useful in visceral manifestations of acute rheumatism when the salicylates fail and in rheumatic pleurisy, pericarditis, and endocarditis. It acts as a sedative, antipyretic, and resolvent; it sometimes provokes diarrhœa and vomiting, and should then be discontinued. The daily amount for men is given as 0.40 gramme (6 grains) and for women 0.30 gramme (4½ grains), taken in divided doses, at hourly intervals, in a mucilaginous potion. Tartar emetic should not be associated with opium.

*Testicular Fluid.*—See Animal Extracts.

*Tetra-ethyl-ammonium.*—See Ammonium.

*Theobromine.*—Hallopeau<sup>3</sup><sub>Dec.13,'93</sub><sup>2</sup><sub>Dec.23</sub> confirms the statements of G. Sée as to the diuretic action of theobromine. He used it in a case of generalized œdema which had resisted every species of diuretic medication. Two grammes (31 grains) of theobromine given in four doses caused the œdema to disappear "absolutely and, so to speak, instantaneously," without giving rise to excessive secretion of urine. The effect was lasting; but the patient, having incautiously exceeded the amount prescribed, felt decided general malaise, which, however, did not last long. Since then Hallopeau has used theobromine in similar cases and always with the best results. In two cases the subsidence of the œdema was followed by profuse desquamation of the limbs, which had been the seat of the swelling.

*Thermodin.*—This new antipyretic has been reported on by von Mering.<sup>116</sup><sub>Dec.,'93</sub><sup>15</sup><sub>Feb.,'94</sub> It is one of the numerous aromatic com-

pounds, and is derived from  $\gamma$ -oxyphenyl-methane; as a more convenient name it has received that of thermodin, on account of its antifebrile properties. It crystallizes in white needles and is soluble in 450 parts of boiling water, and in 2600 parts at a temperature of 20° C. (68° F.). Trials during the last two years prove it to be a good antithermic drug, having been used in enteric fever, pneumonia, influenza, etc. In all these cases its action remained free from unpleasant after-effects (nausea, sickness, collapse, cyanosis, etc.), although temperatures of 102.5° to 104.2° F. (39.2° to 40.1° C.) have been reduced on an average 3° to 3.5° F. (1.66° to 1.95° C.) after a dose of 7 grains (0.45 gramme). The effect commences within the first hour and reaches a maximum in about four hours; after this the temperature slowly rises again. The rebound usually ensues without shivering; the fall is accompanied by moderate sweating. The pulse appears less frequent and shows an increase of tension; in many cases a sense of well-being is experienced. The dose averages from 7 to 10 grains (0.45 to 0.65 gramme), being less in general for cases of phthisis, where a beginning may be made with 5 grains (0.32 gramme). In a case of enteric fever, after thermodin was given for three days in amounts of 7 grains (0.45 gramme), there was observed a fugitive measles-like rash, such as is met with after antipyrin and phenacetin. Schmitt, of Nancy, <sup>14</sup>Apr. 29, '94 tested the drug and concludes that it is without danger, constant in action, very slow in producing an effect, and that its results are sufficiently prolonged. It presents certain advantages over phenacetin, although it is inferior to it in activity.

*Thioform.*—Thioform is a bismuth salt of dithion, a derivative of dithiosalicylic acid, and is a very light yellowish-brown powder which is not poisonous, has no smell, and is insoluble in water. It is used similarly to iodoform and is remarkable for its drying power; it is, however, but slightly antiseptic. E. Fromm <sup>41</sup>No. 40, '94 has found it very serviceable in ophthalmic practice. In conjunctivitis and purulent ophthalmia he dusts it in a very finely powdered state over the conjunctiva, and in strumous ophthalmia in children he prefers it to calomel, as it goes better with internal iodine treatment. In corneal ulcers, even when hypopyon is present, it is also useful. In ophthalmic operations, such as extirpation of the eyeball, it has shown itself valuable on account of its powerful styptic



properties. Schmidt <sup>116</sup><sub>Apr., '94</sub>; <sup>2</sup><sub>June 9</sub> states that it was first prepared as a substitute for iodoform, and that surgically its value is equally great, but that the specific action of iodine, as required in tuberculous affections, is not obtained. When applied to fresh wounds thioform produces rapid drying of the surface, leading to a more rapid cicatrization than has been observed after the use of any other application; this was noticed even in extensive surface lesions, such as burns, weeping eczema, and gangrenous patches, the latter having healed in four days. The author tested the powder in five cases of ulcer of the leg which had resisted other treatment. The ulcer having been cleaned and disinfected, the thioform was thickly dusted over it and covered with cotton-wool and a bandage. Every fourth day the whole dressing was changed, and, though the patient continued to walk during the treatment, the cure required two or three weeks only. Some pain was occasionally produced, but no sign of irritation could be seen. Similar results in the practice of other surgeons have been noted. Finally, the author used thioform internally after having satisfied himself as to its non-poisonous character, and with daily, long-continued doses of 15 grains (1 gramme) better, though similar, results were obtained than with salicylate of bismuth.

*Thiosinamin*.—M. Richter <sup>84</sup><sub>No. 28, '93</sub>; <sup>26</sup><sub>Apr., '94</sub> made careful examinations of the blood of patients undergoing treatment with injections of thiosinamin for lupus, for the softening of cicatrices, and clearing up of corneal opacities, as recommended by von Hebra, and found that, as a rule, directly after injection the number of leucocytes was diminished, but that in a few hours' time an increase set in, restoring the number to that originally observed or even bringing about an absolute increase. Generally, the quantity of hæmoglobin was increased, but no morphological changes were observed either in the leucocytes or the red blood-cells. As a rule, one-third to one-half Pravaz syringeful of 15-per-cent. alcoholic solution of thiosinamin was injected twice a week. A certain amount of "reaction" (redness, swelling, warmth) was observed five times in 4 out of 11 cases of lupus so treated, but no curative effect on the lupous tissue was noticed at all. Even the "reaction" was wanting in 2 cases of lupus erythematodes, several cases of *ulcus cruris*, and 2 cases of cicatricial strictures of the urethra. In 1 case of dermatitis with formation of cica-

trices, after ulcer cruris, the mobility of the foot appeared somewhat increased; also improvement in the vision was demonstrable in 2 cases of corneal cicatrices. L. Y. Mertens<sup>586</sup><sub>Nos. 12-14, '94</sub> concludes, as the result of personal investigation, that thiosinamin will not cure lupus, but that it is sometimes valuable as an adjuvant to other treatment. Its internal administration is followed by the same results as hypodermatic injections. It is undoubtedly possessed with diuretic properties. Van Hoorn<sup>28 80</sup><sub>June, '94; Sept.</sub> describes his results from the use of the drug in lupus. After its injection there was swelling of the skin, often very considerable and rapid; twenty-four hours later a rich desquamation followed; while during reaction there was a sense of heat and stretching of the affected point. When treatment was regularly followed there was almost always improvement; ulcers healed over and swellings were reduced level with the surface. One patient, with wide-spread "lupus tumidus" and "verrucosus" of the left arm and back of the hand, showed marked improvement after fourteen days. Yet in three other cases in which the treatment was followed he saw no improvement until he changed to salicylic plaster. In two cases, handled unsuccessfully with tuberculin, thiosinamin was tried for fifteen months, an injection being given every two or three weeks. At first 2 cubic centimetres (31 minims)—0.2 gramme (3 grains) of thiosinamin—of a 15-per-cent. alcoholic solution (Hebra) and later the same dose of a 10-per-cent. glycerin solution (Duclaux) were used, the latter causing less pain upon injection. Throughout the entire fifteen months the injections were well borne and improvements noted, but at the expiration of this time the patients complained of loss of appetite, numbness of the head, and a sense of weakness and fatigue in the whole body, but especially the limbs. These complaints increasing after each injection and lessening upon cessation of treatment, the remedy was discontinued and again improvement was noted for another three months. As a result of his experience he thinks that in most cases of lupus it is not wise to commence with the thiosinamin treatment, but to hold it in reserve until after the local treatment has failed.

*Thymol.*—Guladze<sup>571</sup><sub>Nos. 5, '94</sub> has successfully treated several cases of favus with thymol. The hair was cut short and the affected parts washed daily for four or five days with green soap. A piece of linen, covered with a mixture consisting of 1 part of thymol, 8 of

chloroform, and 36 of olive-oil, was then applied and renewed three times daily. As soon as the crusts began to fall partial epilation was practiced and the diseased parts touched with a piece of cotton soaked in the ointment. Treatment was continued for three or four weeks until recovery took place, and for a week longer the parts were rubbed twice daily with a mixture containing 2 parts of iodine and 1 part of glycerin. Hartmann<sup>530</sup><sub>No.24,'93</sub> states that toothache due to pulpitis may be relieved by carefully cleansing the carious cavities and inserting a bit of cotton powdered with thymol. In order to dissolve the thymol and hasten its action the mouth may be washed out with lukewarm water several times.

*Thyroid Extract*.—See Animal Extracts.

*Tolypyrin ; Tolysal*.—According to some recent researches carried out by von zur Mühlen,<sup>2103</sup><sub>'04</sub> <sup>6</sup><sub>Oct.27</sub> at the request of Kobert, of Dorpat, the main difference between antipyrin and tolpyrin is that, while the former is a protoplasm poison, destroying the irritability of muscle when injected into it, and thus rapidly, when in large doses, arresting the heart, tolpyrin does not act in this way, but paralyzes the central nervous system, for when applied to an isolated frog's heart it had no effect upon it. In his clinical observations he was able to show that tolpyrin was valuable in acute rheumatism and typhoid fever, and, indeed, confirmed Guttman's previous account of it. He also experimented on orthotolpyrin, an isomeric substance, which appeared to have much the same physiological and therapeutical properties, but to a less marked degree. Tolpyrin, or tolysin, which is, chemically speaking, tolyldimethylpyrazolon, and therefore closely allied to antipyrin, occurs in the form of colorless crystals of an intensely-bitter taste, soluble in water and alcohol, the aqueous solution striking red with perchloride of iron and green with sulphuric acid. It has been used clinically by several German and Hungarian physicians. Guttman<sup>4</sup><sub>No.11,'93</sub> gave it in 15-grain (1 gramme) doses in typhoid fever and pneumonia and found that it lowered the temperature without producing any ill effects, even though, in one case of pneumonia, eight doses were given with only hourly intervals. In rheumatic fever he gave 60 grains (4 grammes) during the twenty-four hours, with good results.

The researches of A. Anjeszky<sup>622</sup><sub>No.16,'94</sub> <sup>16</sup><sub>Feb.</sub> demonstrate that 1 gramme (15½ grains) of tolpyrin every two hours causes a fall of

temperature of  $0.5^{\circ}$  to  $0.8^{\circ}$  C. ( $0.9^{\circ}$  to  $1.44^{\circ}$  F.). The antipyretic action is certain and well marked. According to the intensity of the fever the patients upon whom he tried the remedy were given from 1 to 4 grammes ( $15\frac{1}{2}$  to 62 grains) in four doses. The temperature was taken half an hour after the first dose and afterward every hour. In two hours the fall of temperature ordinarily was from  $1^{\circ}$  to  $5^{\circ}$  C. ( $1.8^{\circ}$  to  $9^{\circ}$  F.). In moderate fevers 1 to 2 grammes ( $15\frac{1}{2}$  to 31 grains) sufficed to maintain apyrexia for seven or eight hours. In marked pyrexia it was necessary to give 3 to 4 grammes (46 to 62 grains) to produce an apyrexial condition, which lasted from 10 to 15 hours. In one case 3 grammes (46 grains) of tolpyrin, given in the height of the fever, caused a fall of temperature of from  $40^{\circ}$  to  $36.8^{\circ}$  C. ( $104^{\circ}$  to  $98.2^{\circ}$  F.). And the patient remained in an apyrexial condition for 14 hours. It was not until 20 hours afterward that the temperature again attained  $40^{\circ}$  C. ( $104^{\circ}$  F.). In a case of tubercle of the apex of the lung one dose produced a subnormal temperature ( $34^{\circ}$  C.— $93.2^{\circ}$  F.). Profuse sweating resulted from the use of the drug. As a rule, it was well borne by patients, producing no digestive trouble, though two cases of vomiting were noted and in one case it caused an attack of urticaria. It was found to have no effect on rheumatism or neuralgia.

Otto Dornblüth, of Freiburg, <sup>121</sup><sub>May, '94</sub> has, during the past year, used both tolpyrin and tolysal with satisfaction in numerous cases. He has derived the same benefit from tolpyrin as from antipyrin in the treatment not only of neuralgia and other varieties of nervous pains, but also in inflammatory pains, as angina and alveolar abscess, nervous insomnia, headache after epileptic attacks, nocturnal enuresis in children, and other affections. He likewise saw tolpyrin succeed where antipyrin failed, as in severe and obstinate migraine. He has never observed an irritant or excitant effect. Antipyrin and tolpyrin have, throughout, the same indications, and it is only to be determined in individual cases which substance occasions the best results. The experience of Dornblüth also convinces him that tolysal is a remedy which, as an antirheumatic, occupies a special position. Tolysal is the salicylate of tolpyrin. The constantly-increasing appreciation of salipyrin, which is the salicylate of antipyrin, has contributed to the acceptance of tolysal. The close resemblance in the action of



antipyrin and tolpyrin does not seem to exist between salipyrin and tolysal. Salipyrin has an admirable influence in influenza, not only upon the subjective symptoms, but likewise in abbreviating the tardy recovery and preventing nervous sequelæ. Tolysal produces an equally-decided effect upon acute articular rheumatism, as well as upon chronic rheumatism, associated with joint-pains, and occasionally with fever. In acute cases its action, in doses of 0.5 to 1 gramme ( $7\frac{3}{4}$  to  $15\frac{1}{2}$  grains) five times daily, is at least as effectual as that of sodium salicylate in the usual amounts. Tolysal does not give rise to roaring in the ears or similar untoward effects, and relapses are not more common than in other methods of treatment. Whether the combination of sodium salicylate with antipyrin or tolpyrin will produce the same effect as tolysal Dornblüth has not been able to determine. Corresponding experiments in regard to salipyrin has led him to the conclusion that it has a somewhat different action from that of its components. In rebellious cases of inflammatory rheumatism, which not infrequently fail to yield to antipyrin alone, tolysal has been found efficacious. The same cases may also have been but little improved by the administration of sodium salicylate and most of the other internal remedies usually employed. In such cases he gave 1 gramme ( $15\frac{1}{2}$  grains) of tolysal five times a day, diminished, after a time, to 0.5 gramme ( $7\frac{3}{4}$  grains) at the same intervals. The drug was employed by Bothe <sup>34</sup> <sub>Aug. 7, '94;</sub> <sup>451</sup> <sub>Sept.</sub> for its anodyne effect in the insane, epileptics, and idiots, one hundred and forty-seven doses having been given to twenty-eight persons. It was found useful in the headache of neurasthenic and hysterical persons and in organic disease of the head, in bone-pains from old syphilitic lesions, and in chronic cases of joint-rheumatism. In a case of migraine, in a woman aged 35 years,  $1\frac{1}{2}$  to 2 grammes ( $23\frac{1}{4}$  to 31 grains) of tolysal were capable of abating an attack, the drug not losing its efficacy in future attacks, though in another case, in a man, it was found to be useless. The odor is very disagreeable, the best method of administration being in hot soup or in Bavarian beer, though, as a rule, the method of inclosing in a capsule is to be preferred. It should never be given on an empty stomach. Klein <sup>297</sup> <sub>No. 9, '94</sub> found it effective in acute articular rheumatism, influenza, pleurisy, and diabetes. Anjeszky <sup>622</sup> <sub>No. 17, '94</sub> finds it of little value as an antipyretic, but equal to salicylic acid as an antirheumatic.

*Traumaticin.*—See Mercury.

*Trichloracetic Acid.*—Von Stein, of Moscow, <sup>385</sup> <sup>39</sup> Jan., '94; July continues to urge his primary claims for this remedy as an ideal cauterant. Admitting that it is more painful than chromic acid and less vigorous than galvano-cautery, he differentiates the non-fibrous hypertrophies as the true field for its use, but claims, as the result of clinical and laboratory experience, to have demonstrated that it is an adjuvant of the greatest value to the other forms of cauterization, increasing the efficiency and lessening the reaction. The applications of the crystals or concentrated solution to a bare or escharred surface prevents all putrefactive changes, almost wholly does away with febrile consequences, and promotes rapid, comfortable healing. Its employment in ozæna cases has not only speedily controlled the odor, reduced crust formation, and hastened improvement, but has even led to so decided an hypertrophic tendency of the sclerosing surfaces as to demand at times reduction by decided cauterization. In acute coryza he has employed weak solutions (1 to 1000 to 2000) by instillation or spray, with prompt and safe resolution after the brief increase of secretion; otitic consequences have seemed especially rare in cases thus antiseptically treated. He cautions against strong applications until the tolerance and inadequacy of weaker solutions have been proved.

Cozzolino <sup>37</sup> Nov., '03 warmly commends trichloracetic acid as the best hæmostatic in epistaxis arising, as such bleedings usually do, from the cartilaginous septum. He generally applies it by means of a pledget of cotton soaked with 1- or 1.5-per-cent. solution. There is but slight reaction, and cicatrization is prompt, the result far surpassing that following chromic-acid or iron preparations.

*Tricresol.*—M. Charteris, of Glasgow, <sup>6</sup> Mar. 31, '94 made some experiments on guinea-pigs to determine the physiological action of this liquid, which is a mixture of orthocresol, metacresol, and paracresol obtained from coal-tar. It is soluble in water to the extent of from 2.2 to 2.55 per cent.; its specific gravity at 20° C. (68° F.) varies between 1042 and 1049, and its boiling-point lies between 185° and 205° C. (365° and 401° F.). As a result of these experiments, he concludes that tricresol is a three times stronger germicide than pure phenol and that it is three times less toxic. Its advantages, consequently, for surgical purposes, are very pro-

nounced, and in all probability some combination of it with an alkaline base will, in the future, be prepared which may, with safety and with profit, be administered internally in specific infectious diseases. These views are shared by Liebreich,<sup>116</sup><sub>Jan., '94</sub> Reed,<sup>109</sup><sub>June, '94</sub> and Gruber,<sup>209</sup><sub>No. 32, '94</sub> who recommends the 1-per-cent. solution as the most serviceable for surgical purposes; a  $\frac{1}{2}$ -per-cent. solution, however, is said to be sufficient in many cases.

Kölsch,<sup>296</sup><sub>Aug. 8, '94</sub> <sup>814</sup><sub>Aug. 15</sub> used tricrosol in the treatment of twelve cases of typhoid fever, to the exclusion of all other medication and even baths. The tricrosol was administered three times daily one-half to one hour after the ingestion of food (milk), in capsules each containing 0.10 gramme ( $1\frac{3}{4}$  grains) dissolved in olive-oil by means of potash soap,—which oily solution has been named enterocresol. Three capsules were given on the first day, 6 on the three days following, 9 on the fifth to the seventh day, and 12 on the three days following. From the eleventh day on the daily number of capsules was diminished in the inverse ratio. Absence of tympanites, of gurgling, of painful sensibility in the right iliac fossa, and of complications and relapses was noted. The pulmonary symptoms were remarkably slight, and convalescence was rapid. The six patients in whom this treatment was instituted early—that is, on the third to the seventh day of the disease—became convalescent in from thirteen to eighteen days. The favorable effect on the fever was striking, and sometimes manifested—even after the ingestion of but 6 capsules a day, but oftener from the day when 12 capsules were administered—by a gradual abatement of the pyrexia and definite defervescence.

*Trional*.—Trional, which is, chemically speaking, sulphonal with an additional ethyl group, has of late been used to a considerable extent by German practitioners in insomnia, especially that due to nervous and mental disease. Its suitability for children has recently been pointed out by A. Claus, of Ghent.<sup>57</sup><sub>No. 45, '94</sub> <sup>6</sup><sub>Jan. 5</sub> He finds that it is especially valuable in the nightmares or “night-terrors” to which nervous children are so subject and also where the sleeplessness is associated with chorea or convulsions. It does not disturb the mental, respiratory, or circulatory functions, and acts rather beneficially than otherwise on the digestion. It does not appear to be so suitable for alcoholic insomnia as chloral, and it has no analgesic action; so that it is of but little use to prescribe

it when the sleeplessness results from pain. As to undesirable effects, in one case a child, 5 years old, after a dose of 10 grains (0.65 gramme), was found the next day to walk unsteadily, the power of co-ordination being interfered with. The dose was diminished to  $7\frac{1}{2}$  grains (0.5 gramme), and no further trouble was experienced. These smaller doses were continued for a week, when the child was able to sleep in its usual manner. This was the only instance in which any unpleasant action was caused. The doses recommended by Claus are as follow: For children of less than 12 months of age, 3 to 6 grains (0.2 to 0.39 gramme); for those between 1 and 2 years, 6 to 12 grains (0.39 to 0.78 gramme); for those between 2 and 6 years, 12 to 18 grains (0.78 to 1.17 grammes); and for older children up to 10 years, 18 to 23 grains (1.17 to 1.5 grammes). The powder can be given in warm milk or, better still, in jam or honey half an hour after supper or, at latest, one-fourth hour before bed-time. It may be prescribed nightly for some considerable time, if necessary, as it does not appear to lose its effect when given continuously.

Charles Rychlinski <sup>640 673</sup><sub>No.2,'94; Sept.</sub> administered the drug one hundred times to fourteen nervous and insane patients, at the same time carrying on comparative experiments with sulphonal, chloral hydrate, and sulphate of duboisine. The dose used was from 0.5 to 4.0 grammes ( $7\frac{3}{4}$  to 62 grains). He regards the drug as especially valuable in functional disorders of the nervous system, exerting no untoward influence, even on patients with cardiac affections. It dissolves readily in hot tea or milk, and is without taste. There are no unpleasant symptoms upon awakening, and the dose required to cause sleep is less than that of most drugs. For these reasons the author prefers it to all other hypnotics.

Hammerschlag <sup>2104</sup><sub>'93</sub> finds the results as good as or better than those with chloral or morphine in the treatment of melancholia, mania, hysterical and epileptic conditions, hypochondria, paranoia, and general paralysis of the insane.

Carl Grünfeld <sup>622 98</sup><sub>No.47,'94; Aug.</sub> has carefully compared the action of trional with that of other hypnotics, in forty cases. In simple agrypnia, melancholic depression, conditions of moderate oppressions, as well as in mania not attended with violent hallucinations, a refreshing sleep of six to eight hours' duration was often produced by doses of 1.0 gramme ( $15\frac{1}{2}$  grains), and always by 1.5



grammes ( $23\frac{1}{4}$  grains). The dose was but rarely increased to 2.0 grammes (31 grains), and then in paralytics. The agrypnia which in secondary dementia is usually dependent upon conditions of irritation or is caused by the varied hallucinations of the insane, was frequently combated by 1.5 grammes ( $23\frac{1}{4}$  grains) of trional, and 2.0 grammes (31 grains) failed to exert an effect only in special and exceptional cases. In the more active conditions of excitement of chronic mania, and in paralysis attended with moderate motor restlessness, 2.0 grammes (31 grains) of trional usually had a reliable action, the effect being absent or very slight on the first, but satisfactory during the following days. In paralytics suffering from extreme motor and psychical maniacal excitement a satisfactory effect was only exceptionally obtained from 2.0 grammes (31 grains), while in many cases even 3.0 grammes (46 grains) proved inactive. As a sedative trional was tested in but one case, with very satisfactory results. Grünfeld thinks that smaller doses will be required for this purpose, since 1.0 gramme ( $15\frac{1}{2}$  grains) sufficed to produce sleep in a case of chronic mania. A good effect was also obtained from the remedy in fractional doses in a case of obstinate restlessness produced by marked hallucinations. In conclusion the author remarks that, while trional is valuable in psychiatric practice, it is much more valuable in the forms of insomnia met with in general practice.

Vogt <sup>6</sup><sub>Aug. 11, '94</sub> concludes that the drug is superior to sulphonal in that it acts more rapidly and procures calm sleep and a normal waking. The dose he recommends is from 15 to 22 grains (1 to 1.43 grammes) dissolved in some hot vehicle. Its use should not be continued beyond five or six consecutive days, such a period sufficing, in the majority of cases, to overcome an insomniac habit. Toxic urinary symptoms are only manifested when the urine is strongly acid in reaction. The symptoms are oliguria and hæmatoporphyrinuria. It is therefore well to render the urine alkaline during the employment of trional, and the constipation sometimes induced by the drug must be combated by means of purgatives in order to reduce the risks of accumulation to a minimum. Bakoffen <sup>2105</sup><sub>'94</sub> also regards trional as one of the best hypnotics, but warns against the symptoms it may provoke if not prescribed with due caution.

Bellamy <sup>1</sup><sub>July 21, '94</sub> reports twenty-five cases of alcoholic delirium

in which trional was used with advantage. The adjunct treatment consisted in the employment of a hot bath, a calomel purge, and in all cases forced feeding, the diet including milk, eggs, and soup. On admission 20 grains (1.3 grammes) of trional mixed in water, with 10 minims (0.65 gramme) of tincture of capsicum, were administered. If the delirium still continued 10 grains (0.65 gramme) more of trional were given in thirty minutes, and if this proved ineffective 20 grains (1.3 grammes) additional were given in an hour. In nearly every instance sleep followed the administration of 50 grains (3.2 grammes), and the pulse and respiration were stimulated. The author concludes as follows: 1. Delirium was controlled with greater rapidity and safety by trional than by other hypnotics. 2. In the majority of cases a marked stimulant effect was observed, possibly on account of the methylic and ethylic elements which enter into the composition of the drug. 3. On account of the low temperature noted in all cases, trional must possess antipyretic properties, thereby simulating its allies of the phenol group. 4. It was always well borne by the stomach, and in one case was rapidly absorbed when administered per rectum. 5. No unpleasant after-effects were observed.

P. Giulio and C. Alessandro<sup>589</sup><sub>No. 108, '93</sub> used trional in thirty-two cases, finding it a good hypnotic and a calmative in cases in which other remedies had to be suspended on account of tolerance being established. It was found very efficacious in psychoses characterized by depression. Beyer<sup>368</sup><sub>B. 25, H. 2, '93</sub> states that if the patient awakes without feeling refreshed, but with a sense of fatigue, somnolence, etc., it may be assumed that too large a dose of the drug has been given. J. S. Kennedy, of Chambersburg,<sup>138</sup><sub>May, '94</sub> has also had satisfactory results from its use.

Oscar Collatz<sup>4</sup><sub>No. 40, '93</sub> observed no injurious effects after long-continued treatment with trional, but he regards it as not absolutely reliable in its action. Ewald Hecker<sup>68</sup><sub>p. 401, '94; Dec. 5</sub> reports the case of a woman, aged 50 years, who had suffered for ten years from marked melancholic depression. Previous experience had shown that a night dose of 45 grains (2.93 grammes) of trional had been followed by excellent results. After ten days' use of this remedy the patient began to complain of pains in the neck and coryza, and, because of a slight fever, remained in bed. Vertigo appeared after a few days, and she fell while walking and felt dull and

wretched. The symptoms of commencing paralytic dementia appeared and the remedy was omitted. After ten days she was able to leave her bed and gradually regained her strength. The drug was employed for only thirty-six days in the above-mentioned dose. The explanation of the symptoms may be found in the observation of Mosso, that in natural sleep the cerebral temperature is unchanged or, indeed, is lowered if sleep be prolonged. In artificial sleep this temperature is raised, while that of the rectum remains constant; active oxidation processes thus possibly go on in the cerebral cells, resulting in profound disturbances. Schultze records <sup>69</sup> Feb. 15, '94; <sup>2</sup> Apr. 7 the case of a woman of 54, suffering from melancholia, on whom other remedies for sleeplessness had no effect. Trional was given in a single evening dose of 0.50 to 1.50 grammes ( $7\frac{3}{4}$  to  $23\frac{1}{2}$  grains) and continued during four or five weeks,  $2\frac{1}{4}$  to 25 grammes ( $6\frac{1}{4}$  to  $6\frac{1}{2}$  drachms) having been taken in all. Toward the end of this time the patient became worse without any discoverable cause. She had to be artificially fed and constipation was marked. The drug was stopped; the patient was removed from the hospital and died soon after. A few days before her discharge the urine appeared of a dark-red (almost black) color and was proved, both chemically and spectroscopically, to contain hæmatoporphyrin. It is striking that so small a quantity of trional should have had so deleterious an effect. The loss of appetite and severe constipation were also attributed to the drug. All the reported cases of hæmatoporphyrinuria after sulphonal, as also the above one, have occurred in women. Herting <sup>295</sup> B. 51, H. 1, '94 adds another case of poisoning in which a patient, aged 30 years, had for a long time taken first sulphonal, then tetronal, and at last trional, the latter in doses averaging 1 gramme ( $15\frac{1}{2}$  grains) daily. Here, too, the urine became dark colored, and the case proved fatal. Herting conjectures that it was not the trional which caused death, but rather the deleterious influence of the sulphonal and tetronal. In this, as in another case, a livid color of the finger-nails was observed after the combined administration of sulphonal and tetronal.

*Tropacocaine*.—See Cocaine.

*Tuberculin*.—Thorner <sup>2106</sup> '94; <sup>2</sup> Sept. 22 has continued to use tuberculin cautiously in his practice, and believes that it may be safely employed, even in the case of patients with fever and advanced

pulmonary lesions, provided that the treatment be commenced with doses of only 0.00005 gramme ( $\frac{1}{13000}$  grain) and not increased to more than 0.001 gramme ( $\frac{1}{64}$  grain), unless there be no fever. He considers that the maximum quantity used for an injection should never be more than 0.10 gramme ( $1\frac{3}{4}$  grains). Great caution is necessary that the solutions used be absolutely aseptic and that no mistake be made in the quantity used. In favorable cases injections are to be continued until all the morbid symptoms have disappeared, and, later on, test injections are advisable. Small doses, 0.00005 gramme ( $\frac{1}{13000}$  grain), should be used at the commencement in all cases, and, when the treatment has been interrupted for any reason, small doses should be used on beginning again. Loss of appetite or the onset of anæmia may render a suspension of the treatment necessary, as may intercurrent infectious diseases, but not syphilis. Phthisis, when "quiescent," had better not be treated with tuberculin. Kossel<sup>169</sup><sub>July, '94</sub> pronounces in favor of the treatment of lupus by tuberculin, combined with surgical measures. Of 23 cases he cured 9 and improved 15 in this manner. He began with 0.001 gramme ( $\frac{1}{64}$  grain) every three days, gradually increasing the dose. The marginal portions were curetted, the cicatrices resisting invasion by the disease. The only case of death was due to tubercular meningitis, and was in no way to be attributed to tuberculin. Hager, of Magdeburg,<sup>14</sup><sub>Apr. 29, '94</sub> has also continued to use the remedy, but with negative results, both in lupus and tuberculosis. E. P. Niles, of Blacksburg, Va.,<sup>81</sup><sub>Sept., '94</sub> from personal experiments with tuberculin, finds that it is the only means whereby tuberculosis can be diagnosed in animals. Physical examination may show well-marked cases of the disease in a dairy or herd, but the latent forms cannot possibly be thus detected. With tuberculin properly used, however, it is possible to detect tuberculosis early enough to eradicate it, and thus make the milk of cows so affected comparatively safe for man and animals dependent upon a fluid diet.

*Turpentine.*—Benoit du Martouret<sup>211</sup><sub>June 17, '94</sub>; <sup>80</sup><sub>Nov.</sub> gives the details of two cases—one of arthritism accompanied with right crural neuritis and cardiac arterio-sclerosis and the other of pyelonephritis of calculous origin—in both of which dry turpentine-vapor baths produced satisfactory results by distinctly increasing the elimination of uric acid. For these baths the fresh resin of



the *pin mugho* was used. In view of the results obtained, the author suggests that cases of pyelonephritis due to the presence of calculi might be cured by the treatment alluded to, gradually so reducing the size of the calculus that it may easily be voided through the natural passages. Sasse<sup>3</sup><sub>V.2,p.300</sub> <sup>814</sup><sub>Aug.1,'04</sub> has successfully used oil of turpentine in the treatment of certain forms of hæmorrhage. He has seen one case in which it immediately arrested an abundant hæmorrhage consequent upon the extraction of a tooth, after several other measures, including plugging with iodoform gauze, had failed to produce the desired effect. In hæmorrhage from the mouth in scorbutic patients he has successfully had recourse to penciling the gums every hour with pure, rectified oil of turpentine, together with small doses of the remedy internally. In a case of vesical hæmorrhage, which had proved refractory to all other hæmostatic measures, the bleeding was completely arrested by the use of a mixture containing  $\frac{1}{2}$  per cent. of oil of turpentine, a tablespoonful every hour. The unpleasant smell emitted by persons suffering from incontinence of urine can be conveniently covered, according to Emminghaus,<sup>3</sup><sub>Aug.22,'04</sub> <sup>6</sup><sub>Oct.27</sub> by means of 10-drop doses of turpentine administered in milk or water three times a day. This converts the smell of stale urine into an odor resembling that of violets, as is well known to persons who have taken turpentine. The remedy is perfectly harmless in most cases, and has been given by Emminghaus for many weeks at a time without any inconvenience. It is, however, contra-indicated in ulcer of the stomach, gastric catarrh, and nephritis, and also in persons in whom turpentine tends to upset the digestive functions.

*Venesection.*—Sir Benjamin Ward Richardson<sup>38</sup><sub>V.10, No.39</sub> considers venesection sound practice under several conditions of disease, notably the following: (a) In acute spasmodic seizures, as in spasm of croup, in colic, and in angina with symptoms of oppression from distension of the right side of the heart with blood. (b) In acute pain, membranous or spasmodic, as in sudden pleuritic or peritoneal pain or in pain from passage of a calculus,—hepatic or renal. (c) In acute congestions of vascular organs, as of the lungs or brain,—apoplexies. (d) In cases of sudden shock or strain, as after a fall or a blow, sun-stroke or lightning-shock. (e) In some exceptional cases of hæmorrhage of an acute kind unattended by pyrexia.

## EXPERIMENTAL THERAPEUTICS.

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*Absinthe*.—As has previously been observed by Marcé, Magnan, Horsley, and Gotch, there seems to be a striking resemblance between the fits of idiopathic epilepsy and those caused by the action of absinthe. Under the influence of this drug twitchings of the muscles of the face and ears are noticed, followed immediately by clonic and tetanic spasms of the muscles of the trunk and extremities, with salivation, frequent cries, involuntary passage of urine, and finally by a period of unconsciousness. In a preliminary report read at the annual meeting of the British Medical Association in August, 1893, Robert Boyce, of London, <sup>2</sup> Nov. 18, '93 gives the methods of procedure in regard to an experimental study (upon cats) of the subject under consideration. The experiments were divided as follows: 1. Removal of one hemisphere. 2. Removal of both hemispheres. 3. Removal of whole cerebellum or of one lobe and the opposite half of the cerebrum. 4. Removal of one hemisphere, combined with hemisection of the lower cervical spinal cord (*a*) on the opposite side and (*b*) on the same side as the lesion, and *vice versa*. 5. Division of the spinal cord. Immediately after, or some hours, days, or weeks subsequent to each group of experiments, excitation by means of absinthe was practiced and the results carefully noted. After detailing these results, which are extremely interesting from a physiological stand-point, the author concludes that there are not yet sufficient data to warrant an assertion as to what share the cerebellum may take in the production of the clonic spasms. Fits may occur in the absence of the cerebellum, but removal of one of the lobes of the latter, coupled with that of the cerebral hemisphere, tends to produce a unilateral condition. The auxiliary action of the cerebellum becomes, therefore, the point needing

(B-1)

elucidation; but the experiments have not as yet been sufficient to furnish any light upon the subject. That the cerebellum should exercise some influence seems probable from the symptoms which are known to follow removal of portions of the cerebellum. The experiments indicate that one hemisphere, with an intact cerebellum, is capable of discharging impulses to both halves of the body, and they tend to show that one-half of the cord can do the same. Rhythmic clonic fits are not obtained, furthermore, where the hemispheres are absent, the cerebellum remaining intact. The impulses may descend through other channels than the pyramidal tracts, as is shown by the fact that, after the removal of one hemisphere the corresponding pyramid degenerates and atrophies; still, fits can be obtained on that side by absinthe; hemisection of the cord, however, arrests them at once. The experiments further demonstrated that absinthe has an action upon the whole of the central nervous system.

*Acetanilid.*—In a series of investigations, A. Rovighi <sup>1169</sup><sub>p.512,'98</sub> has observed that the elimination of sulphuric ether by the urine is increased by the administration of acetanilid in doses of from 1.50 to 2 grammes (23 $\frac{1}{4}$  to 31 grains).

*Aceto-paramidophenol.*—See Paramidophenol.

*Alcohol.*—Féré <sup>14</sup><sub>Mar.21,'94</sub> affirms that the iso-alcohols occupy an intermediate place in the order of the alcohols, and that their poisonous properties may be classified in the following order as regards their intensity: Ethylic alcohol, iso-ethylic alcohol, amylic alcohol, iso-amylic alcohol, etc. From the results of an experimental study of alcohol, C. Giofredi, of Naples, <sup>1009</sup><sub>p.83,'98</sub> states that in the frog non-fatal doses of the drug in the normal animal become fatal after the liver has been extirpated. The symptoms appear more rapidly and are more intense, all the symptoms of poisoning being caused by doses the effects of which can hardly be perceived in the normal frog. Ablation of the brain also intensifies the phenomena of alcoholic intoxication, but these effects are, nevertheless, inferior to those observed after removal of the liver. From the results obtained in cats subjected to chronic poisoning with alcohol, and in the viscera of which the drug was chemically determined, it was shown that the protective action of the liver and brain was still more marked when small daily doses of alcohol were administered. David Cerna, of Galveston, Texas, <sup>80</sup><sub>Apr.16, May 15, June 15,'94</sub> conducted

a long series of laboratory experiments upon the physiological action of alcohol, and carefully reviewed the literature of the subject. The experiments were exclusively made on dogs. His own results, coupled with those of previous investigators, led him to formulate the following conclusions: 1. Alcohol in small amounts excites and in large doses depresses both the peripheral motor and sensory nerves. 2. Excessive quantities cause a spiral degeneration of the axis-cylinder of nerve-fibres. 3. Reflex action is at first increased and afterward diminished by an influence exercised upon the spinal cord and the nerves. 4. In small amounts it stimulates the cerebral functions; it afterward, especially in large quantities, depresses and finally abolishes them. 5. Alcohol causes lack of co-ordination by depressing both the brain and the spinal cord. 6. In toxic doses it produces hyperæmia of both brain and spinal cord, especially of the lumbar enlargement of the latter. 7. Small doses produce increased rapidity of the cardiac beat; large amounts, a depression of the same. In either case the effect is brought about mainly through a direct cardiac action. 8. In small quantities it causes a rise of the arterial pressure by direct action upon the heart; in large amounts it decreases the arterial pressure similarly through cardiac influence. 9. In large doses alcohol enhances coagulation of the blood; in toxic quantities it destroys the ozonizing power of this fluid, causing a separation of the hæmoglobin from the corpuscles. 10. In small doses it has little or no effect on the respiratory function; in large amounts it produces depression of both rate and depth of the respiration through direct action on the centres of the medulla oblongata. 11. It kills by causing failure of the respiration. 12. Alcohol exercises a varying action on the elimination of carbon dioxide, sometimes increasing, sometimes decreasing it. 13. The action of alcohol on the amount of oxygen absorbed also varies and may be said to be practically unknown. 14. It lessens the excretion of tissue-waste, both in health and disease. 15. In small amounts it increases the bodily temperature, in large doses diminishes it. The fall of bodily temperature is due mainly to an excess of heat-dissipation caused by the drug. 16. Alcohol, in sufficiently large amounts, has a decided antipyretic action. 17. In moderate amounts it aids the digestive processes. 18. It diminishes the absorption of fats. 19. Alcohol exercises a varying influence on the



amount of urine secreted, but probably increases the activity of the kidneys. 20. In large doses, or when continuously used for a long time, it produces cirrhotic changes, of the liver especially, and paralysis of spinal origin. It also causes insanity, epilepsy, and other maladies. - 21. Alcohol is mainly burnt up in the system when taken in moderate quantities, but when ingested in excessive amounts is partly eliminated by the breath, the kidneys, and the intestines. 22. Alcohol is a conservator of tissue, a generator of vital force, and may therefore be considered as a food.

*Allium Ascalonicum*.—See Onions.

*Allium Cepa*.—See Onions.

*Allyl-guaiacol*.—See Guaiacol.

*Ammonia*.—According to the studies of T. Lauder Brunton and S. Delépine, of London, <sup>2047</sup><sub>No. 334, '94</sub> ammonia exercises a depressing action on the liver, producing an increase in the amount of iron and a diminution in glycogen.

*Ammonium Chloride*.—The same authors <sup>2047</sup><sub>No. 334, '94</sub> state that ammonium chloride acts as a stimulant to the liver, causing at the same time a slight diminution in the amount of free iron in the organ. V. V. Malinine <sup>2028</sup><sub>'93</sub> has shown that, in doses of 5 grammes (1½ drachms) per day, it enhanced the assimilation of fatty articles of food, increased the diuresis, and diminished the bodily weight. The water of the stools was also increased. He observed a diminution of the cutaneo-pulmonary losses. V. S. Tchernycheff <sup>2028</sup><sub>'93</sub> found that, in daily doses of 5 grammes (1½ drachms), chloride of ammonium increased the assimilation of nitrogenous food and of nitrogenous waste. The elimination of improperly-oxidized products of neutral sulphur was augmented. It diminished the number of the stools, but increased the absolute quantity of urine and the urinary salts. The reaction of the urine remained acid, but its specific gravity was diminished.

*Amyl-dichloramine*.—Boinet and Berg <sup>46</sup><sub>Aug. 15, '94</sub> have found that this drug causes congestion of the lungs, the kidneys, and the nerve-centres. An injection of 5 drops was followed, in a rabbit, by intense pain with convulsive movements, soon followed by a complete muscular relaxation, a momentary arrest of respiration, and weakness of the heart's action. In the frog the effects produced were somnolence, diminution of sensibility, and pronounced muscular paralysis of the hind extremities.

*Amyl-nitrite*.—See Nitrites.

*Amylene*.—B. W. Richardson, of London, <sup>38</sup><sub>4th Quarter, '98</sub> writes an interesting paper on the physiological properties of amylene. In the pure state this substance has an oily character and an odor resembling that of old whisky. It appears in the form of a liquid with a specific gravity of 0.689 at 60° F. (15.6° C.) and a boiling-point of 95° F. (35° C.). It is soluble in water in the proportion of 1 part to 9319 parts, and is readily soluble in alcohol and in ether. It is said that water dissolves 2.35 per cent. of amylene vapor, the water tasting of amylene for a long time. It has antiseptic properties, like nitrite of amyl, and prevents the putrefaction of blood. The odor evolved from a bottle that has contained blood and amylene resembles that of rosemary. The drug prevents decomposition of fresh flowers, but changes their color. According to experiments performed upon the lower animals and on man, amylene causes a slight excitement, a rapid inebriation, followed soon afterward by weak extremities, sudden collapse and coma, with total insensibility to pain, but not always, and indeed rarely, with an equivalent loss of consciousness. Experiments on human beings, including the person of the author, show that the vapor of amylene, by inhalation, produces a state of anæsthesia in which acts of consciousness, previously conceived and carefully carried out, may be performed, without remembering afterward any single fact connected with the action. This is a remarkable phenomenon, and seems to show that the human brain may exhibit objective consciousness apart from the subjective consciousness of life; in other words, a consciousness of which it is itself unconscious, and this under the mere influence of a volatile fluid which mixes so indifferently with blood at 98° F. (36.7° C.) that one part of it only will combine with a little over 10,000 parts of blood. The author finds an analogy between this action of amylene and the phenomena of somnambulism. The insensibility caused by amylene is quite complete, but exceedingly transient. After the drug is removed, recovery is rapid. Before complete insensibility is produced, three well-marked stages are observed: the first is one of mild excitement, during which the face becomes red and congested; the second is a period of staggering inebriety, and the third stage one of collapse and insensibility. The existence of a fourth stage, that of muscular relaxation, as pointed

out by a previous investigator, Snow, is denied by Richardson, who states, further, that during amylene narcosis a peculiar, minute tremor of the muscles, but no convulsion, is not unfrequently noticed. In sufficiently-large doses amylene produces death, and the only post-mortem change observed is engorgement of the right heart. No change in the color of the blood is produced; neither is there any alteration in the corpuscles or in the natural period of coagulation of the blood observed. It lessens muscular power, but this effect is not lasting. The fatal action of amylene is attributed not to any inherent powers of its own, but to the fact that when the drug finds access to the circulation it separates in the form of vapor, producing bubbles, and thus acts like air introduced into a vein. Locally, in the form of a spray, amylene acts as an efficient anæsthetic, being more rapid than anhydrous ether and more stable than amyl-hydride, which it closely resembles in its physiological action.

*Amylic Alcohol.*—See Alcohol.

*Aniline.*—T. Lauder Brunton and S. Delépine, of London, <sup>2047</sup><sub>No. 334, '94</sub> studied the action of this drug, but reached no positive conclusion regarding its influence on the liver. In one of their experiments it seemed to act as an hepatic stimulant, though it finally caused degenerative changes in the cells. No alteration in the amount of glycogen was produced. Still, in another case it caused a great accumulation of iron in the liver.

*Animal Extracts.*—In a series of experiments on dogs and rabbits, M. H. Roger <sup>410</sup><sub>No. 2, p. 216, '94</sub> studied the action of the extracts of muscle upon the temperature. He found that they contain thermogenic substances. Whether these substances pre-exist in the tissues or originate during the manipulations which they undergo could not be determined.

*Antipyrin.*—According to the researches of A. Rovighi <sup>1169</sup><sub>p. 572, '93</sub> the elimination of sulphuric ether by the urine is increased by antipyrin in doses of from 1.50 to 2 grammes (23¼ to 31 grains).

*Arsenic.*—A. Severi <sup>589</sup><sub>Nov. 9, 10, '93</sub> has studied experimentally the ultimate fate of arsenious acid in the animal organism, finding that, administered hypodermatically to the dog in such doses as to produce acute poisoning, it is eliminated by the urine almost wholly unchanged; the elimination, beginning immediately after the injection, is greatest during the first few hours, and continues for

three or four days at the most. Even in cases in which small doses are given daily no traces of arsenites are discoverable in the urine; in cases in which rather large doses are given daily for ten or twelve days the elimination of arsenites goes on for a somewhat longer time than stated above.

*Arterial Blood.*—In an experimental study upon rabbits and dogs, with the object of determining the effects of arterial blood upon the temperature, M. H. Roger<sup>410</sup><sub>No.2,p.216,'94</sub> found that the entire arterial blood possesses a slight temperature-reducing property; that it is sometimes thermogenic, this effect being noted when the blood is taken from a sick animal or exposed to cold; that, in the latter case, the thermogenic effect disappears when the animal is placed for twenty-four hours in a warm place, or when a preliminary venesection is made; that defibrinated blood, serum, and the exudates of pleurisy and of hydrocele produce elevations of temperature, sometimes preceded by a slight lowering.

*Asparagus.*—Asparagus being recommended as a diuretic, Samuel Wilks, of London,<sup>6</sup><sub>Apr.28,'94</sub> calls attention to the fact that, three years previously, he had asked the opinion of the profession on the subject. Of the four replies received, three contained positive statements to the effect that, from clinical observations, asparagus exercised an inhibitory action on the renal function. In spite of what text-books teach, Wilks believes its action to be inhibitory to diuresis, and therefore not diuretic. I. Burney Yeo, of Mayfair,<sup>6</sup><sub>June 16,'94</sub> held a contrary opinion, and maintained that the ordinary use of asparagus has a tendency to diminish the amount of urine excreted. In reply, Wilks cited the cases of two individuals in whom the ingestion of asparagus was followed by a distinct diminution of the urinary flow. I. Burney Yeo,<sup>6</sup><sub>June 23,'94</sub> however, considered the evidence brought forth by Wilks as inadequate, and affirmed that, upon experimental grounds, this vegetable does act as a diuretic. Charles H. Ralfe, of London,<sup>6</sup><sub>June 30,'94</sub> has noticed, from observations on himself as well as on patients, that after eating asparagus (especially that having much white stalk) there was a tendency to increased micturition, sometimes with uncomfortable perineal irritation; but the amount of urine was decreased about one-third, the fluid exhibiting a darkish tinge and the highly-characteristic odor. These phenomena, however, were not so marked with the green variety of asparagus, and



from this the author concludes that the active principle of the plant resides in the stalk,—a principle which, as a yellow, crystalline body, has been isolated by Neuki.<sup>273</sup>  
B.29, H.3,4 Ralfe believes that asparagus exercises an inhibitory action on the renal function, and that the dietetic use of the vegetable, therefore, should be forbidden to patients suffering from granular or contracted kidneys. In a later communication from Samuel Wilks,<sup>6</sup>  
July 7, '94 based on the experience of a number of reliable medical men and on his own, that author continued to uphold the view that asparagus is not a diuretic. The question is an interesting one, and should be thoroughly ventilated, clinically as well as experimentally. This could easily be done by employing the isolated active principle.

*Atractiline*.—See *Carlina Acaulis*.

*Atropine*.—While acting as a depressant to the hepatic function, atropine, according to the recent investigations of T. Lauder Brunton and S. Delépine, of London,<sup>2047</sup>  
No.334, '94 causes no change in the amount of iron in the liver, and only a slight diminution in the quantity of glycogen. W. H. Thompson,<sup>178</sup>  
Dec., '93 after a series of careful experiments, made to determine the nature of the work of the kidney under the influence of atropine, concluded that this alkaloid diminishes the quantity of urine; that it diminishes the total quantity and percentage quantity of urea; that it increases relatively, and in many cases absolutely, the amount of nitrogen, other than that contained in urea; and that these effects of atropine cannot be attributed to the influence which it exercises upon blood-pressure. How atropine acts to produce an elevation of the bodily temperature has not been definitely determined. The subject has been investigated by Isaac Ott, of Easton, Pa.,<sup>242</sup>  
Nov., '93 thirteen experiments on cats being performed. The results of several of these prove that the rise of temperature is not spinal, as heretofore held by the same observer. The results obtained with the ingestion of atropine, after various operations, such as section in front of the pons Varolii and of the medulla oblongata, were so similar to those obtained after the same operations *without* the atropine that the author finds it difficult to speak accurately as to the cerebral centre affected. The slight rise of temperature observed in the rabbit after puncturing the medulla oblongata or pons Varolii has not led Ott to believe in the existence, in these bodies, of thermogenic centres. He therefore concludes that, until the

existence of heat-centres in the medulla and pons has been accurately determined, it is useless to assume that atropine acts upon them.

*Benzo-naphthol*.—It is stated by A. Rovighi<sup>1169</sup><sub>p.572,'93</sub> that benzo-naphthol causes at first a slight increase in the elimination of sulphuric ether by the urine. A diminution of such elimination is produced, however, two or three days after the ingestion of the medicament.

*Benzol*.—This drug, according to T. Lauder Brunton and S. Delépine, of London,<sup>2047</sup><sub>No.334,'94</sub> exercises a stimulating effect on the activity of the liver, sometimes producing a diminution in the amount of glycogen and also of free iron. In a case of fasting liver, the drug caused a doubtful increase of iron.

*Benzoyl-guaiacol*.—See Guaiacol.

*Bismuth*.—The salicylate of bismuth, according to A. Rovighi,<sup>1169</sup><sub>p.572,'93</sub> causes a slight increase in the elimination of sulphuric ether by the urine. This elimination is somewhat diminished two or three days after the administration of the drug.

*Bisulphate of Quinine*.—See Cinchona.

*Bromic Acid*.—It has been maintained that bromic acid produces harmful effects on digestion. The results obtained by Hubner<sup>54</sup><sub>p.163,'94</sub><sup>15</sup><sub>July,'94</sub> after a special investigation, however, seem to show that bromic acid exercises a digestive action inferior only to that produced by hydrochloric acid.

*Butyl-nitrite*.—See Nitrites.

*Calcium*.—The action of the calcium salts on the contractility of the heart has been investigated by W. H. Howell,<sup>2048</sup><sub>May 30,'94</sub> who found that when the heart of the turtle is fed with decalcified blood the contractions become less frequent, the diastole being lengthened and also irregular and jerky in its action, the organ finally coming almost to a complete stand-still,—practically a potash paralysis. If blood with excess of chloride of calcium is then supplied to the depressed heart, this organ very soon begins to beat more frequently and regularly, and is finally restored to a practically-normal condition. Howell thinks, however, that it is impossible to decide absolutely whether it is the absence of the calcium salts or the excess of the oxalates which causes the paralysis, it being still practically impossible to precipitate all of the calcium salts without an excess of oxalates.

On the supposition that lime-water caused an alkaline urine in a child, John J. Abel, of Baltimore, Md., <sup>764</sup><sub>Apr., '94</sub> gave to a healthy boy, by way of experiment, cream of lime in the milk and other articles of food. On the third day the urine of the boy gave off free ammonia and exhibited all the characteristic reactions of a dilute solution of calcium carbonate. Upon further experiments on the lower animals, the author found that when slaked lime was mixed with the food of dogs fed on bone-free meat their urine became strongly alkaline and spontaneously gave off carbon dioxide and ammonia. This lime-urine exhibited all the characteristics of a weak aqueous solution of calcium carbonate, and a white powder was isolated from it which behaved in every way like synthetically-prepared calcium carbamate, except that it gave less accurate results when subjected to quantitative analysis. Human urine was found to react exactly like that of the dog when large amounts of lime were taken in the food, and it likewise contained calcium carbamate.

The absorption and elimination of calcium have been investigated by G. Rudel, <sup>273</sup><sub>v. 33, p. 79, '93</sub> who states that after the administration of acetate of calcium to healthy children the quantity of calcium found in the twenty-four hours' urine increased from 80 to 120 per cent.; this increase, however, only represented from 1 to 3.8 per cent. of the quantity ingested. The phosphate of sodium given internally diminished the amount of calcium eliminated by the urine, but hydrochloric acid increased it, probably owing to the fact that the phosphate of calcium, being insoluble, remains unabsorbed, while the chloride of calcium, on account of its solubility, is easily taken up by the intestinal mucous membrane. Opium was found to increase the elimination of calcium by the urine, this effect being attributed to a diminished intestinal peristalsis caused by the drug, thus facilitating the absorption. The acetate of calcium was administered hypodermatically to animals. In the rabbit, from 26 to 34 per cent. of the amount ingested was recovered from the urine; in the dog, only about 12 per cent.

*Carbon Tetrachloride.*—Laborde <sup>927</sup><sub>July 7, '94</sub> affirms that the tetrachloride of carbon, chemically pure, acts differently from the same substance as obtained in commerce. The pure article may be employed upon the lower animals as an anæsthetic. It causes a sleep similar to that produced by chloroform, with this difference: in

carbon-tetrachloride anæsthesia the medullary reflexes are considerably increased; this action may be compared to that of chloralose. The vapors of pure tetrachloride of carbon are odorless and non-inflammable. They do not irritate the mucous membrane, as do the vapors of the commercial stuff. J. F. Heymans and D. Debuck, <sup>288</sup> <sup>80</sup> <sub>Apr.1,'94; July,'94</sub> in a series of experiments, have determined that, in the rabbit, the tetrachloride of carbon increases the elimination of urea, of phosphates, and of the chlorides. Their results appear to show also that the same agent enhances the activity in the secretion of urea, phosphates, and chlorides in the tissues themselves.

*Carlina Acaulis*.—The toxic action of the root of the *Carlina acaulis*, according to the studies of C. Lazzaro, <sup>996</sup> <sub>May 10,'94</sub> is due to an acid substance contained in the plant, *atractiline*, which produces convulsive effects by exciting the bulbo-cerebral centres.

*Catha Edulis*.—From preliminary experiments with an extract of the leaves of *Catha edulis*, order of Celastraceæ, T. Shennan <sup>2</sup> <sub>July 28,'94</sub> has noticed, in frogs, a stage of narcotism and sluggish reflexes, the latter, especially the abdominal reflex, becoming very marked afterward. After death from the drug the heart was found arrested in diastole and the bladder distended.

*Chloral*.—A. Cavazzani <sup>505</sup> <sup>814</sup> <sub>p.1561,'93; Feb.16,'94</sub> has shown that, when administered by intra-peritoneal injections, chloral determines an irritation of the functional epithelial cells of the kidneys, accompanied by a distinct fatty granular degeneration of the epithelium of the convoluted tubules. These results were obtained after a few injections. After a more prolonged use of the drug the degeneration implicates all the tubules with the exception of the straight ones. In more severe cases there is a granular swelling of all the renal epithelium, showing all the characteristics of a beginning acute parenchymatous nephritis. The Malpighian tufts, however, always appear to remain normal, and there is never any implication of the interstitial connective tissue. When administered by the stomach the same lesions occur, but in a lighter form, and only after prolonged use. These renal lesions, unless too far advanced, commonly disappear after the removal of the drug.

*Chloralose*.—This substance has been investigated experimentally by Ernest Chambard, of Paris, <sup>92</sup> <sub>Apr.10,'94</sub> upon frogs and man. Chloralose, it will be remembered, results from the action of an-



hydrous chloral upon glucose. It has a bitter taste, and is more or less soluble in hot water and in alcohol. It is represented by the formula  $C_8H_{11}Cl_3O_6$ . The toxic dose is about  $\frac{1}{10000}$  of the body-weight; when chloralose is injected into the frog in this proportion, it produces a condition similar to that observed after removal of the cerebral hemispheres. Spontaneous movements are abolished, but reflex and automatic actions remain intact. Soon afterward, however, respiration is paralyzed, followed by the disappearance of all reflex activity, and the animal lies apparently dead. On opening the chest of the animal it is found that the heart is still beating quite vigorously, this cardiac action continuing for two or more hours after the stoppage of the respiratory movements. The effects of the drug were observed in patients suffering from a variety of mental diseases, in all of whom, it is stated, the drug produced a profound sleep, lasting several hours. The doses varied from 1 to  $1\frac{1}{2}$  grammes ( $15\frac{1}{2}$  to  $23\frac{1}{4}$  grains). In most of the cases sleep came on gradually, but in some it appeared suddenly, so that the patient would drop asleep while talking, walking, or eating. In some instances the sleep was preceded by muscular tremors, or simple twitchings, dizziness, and difficulty of speech. Nevertheless, it is affirmed that the sleep produced is not very different from normal sleep. It is more profound; so that the patient becomes insensible to pinching or pricking of the skin, while the corneal reflexes seem to be absolutely abolished. The pulse appears regular and somewhat stronger than normally. No marked alteration of the respiration was noticed, but there was a slight depression of the bodily temperature. These phenomena the author divides into two groups: The first group comprises psychical and psycho-motor phenomena which resemble the automatic actions observed in somnambulism; and in the second group he places the motor complications, such as the muscular tremors, which in many instances resemble the tremors noticed in general paralysis of the insane. In some patients choreic movements were observed, in others twitchings of an epileptiform character, and in still other patients the latter phenomenon was accompanied by foaming at the mouth and reddening of the face. The action of chloralose has also been investigated on the lower animals and on man by Cappelletti.<sup>112</sup> His conclusions in regard to the action of the drug on the lower animals are as follow: In frogs, small doses

increase the reflex excitability; medium doses, diminution of voluntary movement, the power to perform which disappears after an amount varying from 0.005 to 0.010 gramme ( $\frac{1}{12}$  to  $\frac{1}{6}$  grain) has been administered. In rabbits chloralose produces, first, a stage of excitement, followed by sleep, with diminution of voluntary movements and exaggeration of the superficial reflexes. Convulsions appear, similar to those seen in the rat. In dogs, sleep is preceded by a period of excitement, during which the animal staggers about and is insensible to his surroundings; the reflexes are exaggerated and the sense of pain is abolished; when the sleep is not profound convulsions are a prominent symptom; a dose of 0.15 gramme ( $2\frac{1}{4}$  grains) per kilogramme ( $2\frac{1}{5}$  pounds) is enough to induce sleep. In frogs the frequency and force of the heart-beats are not altered by small doses; large doses cause the beat to become slower and less powerful. In rabbits and dogs the carotid pressure is not affected by small or medium doses, and it is only slightly lowered by large ones. The heart-beats are likewise practically unaffected. The respiration is slowed, and in the case of large doses its rhythm is somewhat altered. In rabbits and dogs the temperature is lowered, often to a marked extent. C. Lombroso and A. Marro<sup>739</sup><sub>June, July, '93</sub> state that the drug has a tendency to lower the bodily temperature. It also diminishes the amount of urine, this phenomenon being accompanied with an increase of the specific gravity of this fluid. It causes a decrease of urea and of chlorides in the urine.

E. Marandon de Montyel, of Paris,<sup>67</sup><sub>July 30 to Sept. 15, '94</sub> summarizes an elaborate study of the action of chloralose as follows: 1. Of all the actions of chloralose on the organism, that upon the nervous system is the most pronounced. It is made manifest chiefly upon the brain and the spinal cord. 2. The action on the brain causes two kinds of effects: one of depression and one of excitability. The effect of depression is intense and lasting; that of excitability is slight and fugacious. 3. The depressant action upon the brain presents itself in two phases: sleep and sedation. 4. The sleep caused by chloralose comes on rapidly, is exceptionally preceded by intoxication, heaviness of the head, stupor, or moderate cephalalgia, this being often quite marked, but not exaggerated; at other times there appear lassitude, feebleness of the lower extremities, and various other troubles on different days, the narcosis

being followed by a feeling of well-being. This sleep, lasting several hours, is quite profound; though the patient may easily be disturbed, the sleep is calm from a psychical stand-point, no dreams being produced. 5. The sedation, which may be considered as the first degree of the quieting action, is alone made manifest when the drug is acting on an excited medium. The sedation is more or less profound, sometimes simulating a condition of stupor. 6. The exciting action upon the brain is generally slight and fugacious, and sometimes imperceptible. On certain individuals, however, it may give rise to a crisis of delirium. 7. Chloralose has the peculiar property of causing a psychical blindness. 8. The drug is capable of producing dilatation of the pupil, a diminution of visual acuteness, accompanied sometimes with diplopia. 9. Upon the various sensibilities the action of chloralose is very feeble; in such instances the action of the drug is irregular. 10. The influence of chloralose upon the reflexes is still more feeble, but these are generally excited above normal. 11. On motion, as upon the brain, the effects are marked, and appear also in two forms. There is one characterized by muscular hyperexcitability; the other by muscular relaxation. But, contrary to what happens in the brain, it is the exciting action which is quite marked, the sedative action being slight and fugacious. 12. The sedative action upon the muscles consists simply of a sense of weakness of the lower extremities. 13. The exciting action on the muscular system is generally made manifest by muscular tremors; fibrillary contractions; isolated contraction of a muscle or a group of muscles; contractions of all the muscles of one extremity or of a region of the body; sudden, jumping contractions of the muscles of the body; crises of general convulsions. These phenomena come on under no law, nor do they follow a special order. 14. The muscular hyperexcitability produced by chloralose is lessened or attenuated by the sleep caused by the drug. It is during the narcosis that the diminution or the intensity of the phenomenon is observed, according to the degree of the narcosis. 15. Another variety of muscular hyperexcitability is noticed in individuals under the influence of chloralose,—i.e., the patient passes his hand over the head, face, and neck, as if suffering from some disease of the hair. 16. The double exciting and sedative action upon the brain and the spinal cord is always made manifest in both organs in an op-

posing manner; that is, the sedative action on the brain is associated with the muscular hyperexcitability, the exciting action corresponding with the muscular relaxation. 17. In a calm subject chloralose is capable of producing a periodical respiration. 18. The state of the dynamometric force of the temperature, the number of respirations, the arterial pressure, and the pulse-rate vary with the modifications in the cerebro-spinal system. During the psychical sedation accompanied with muscular hyperexcitability, there are observed an increase of the dynamometric force, an increase of the temperature, an increase of the number of respirations, an increase of the arterial pressure, but a diminution of the pulse-rate. During the psychical excitability associated with muscular relaxation, there are noticed a diminution of the dynamometric force, a diminution of the temperature, a diminution in the number of respirations, a fall of the arterial pressure, but an increase in the number of heart-beats, these actions being less pronounced than the preceding ones, which always come on first. The diminution of the arterial pressure is really relative, for it remains higher than before the administration of the drug. 19. There is observed a curious respiratory rhythm following the convulsions of the respiratory muscles under the influence of the muscular hyperexcitability. 20. Chloralose is capable of steadying a very irregular pulse, the diminution of the number of heart-beats persisting even after awakening from the sleep caused by the drug. 21. Chloralose increases the appetite markedly. Exceptionally it causes gastric disturbances, eructations, thirst, vomiting; but it is interesting to note that even in such cases the appetite is exaggerated. 22. Chloralose exercises a favorable action on nutrition. 23. The medicament is not a true diuretic, since it does not produce an increase in the amount of urine secreted in the twenty-four hours; but it causes a relative polyuria immediately after its administration. 24. Chloralose exercises no action upon the organs of sense except that of sight, nor on the vasomotor system, the genital organs, or the intestines. It does not affect the secretions except the urinary secretion, nor does it influence micturition.

*Chloride of Ammonium*.—See Ammonium Chloride.

*Chloroform*.—Edward Randall and David Cerna, of Galveston, Texas,<sup>9</sup> Aug. 25, '94 after reviewing the literature of the subject,



describe in detail the results of their experimental investigations upon the action of chloroform, which results are practically the same as those of Hare and Thornton (see last year's ANNUAL). This is the more striking from the fact that Randall and Cerna began their experiments quite convinced that death from chloroform occurred through primary cardiac paralysis. In not a single experiment, however, did they see distinct cardiac failure preceding the stoppage of the respiration, and in only one case surely and in a second one probably was there noticed a simultaneous arrest of both the respiration and the action of the heart. It will be remembered that Hare and Thornton recognized very distinctly that profound arterial depression associated with cardiac failure, even though death might physiologically be due to failure of the respiration, was a dangerous and never-to-be-forgotten possibility, and they recommended that the respiration should be watched more than the circulation alone, because they believed that the respiration would give the first indication of the danger. While agreeing in this statement, Randall and Cerna insist more strenuously than did Hare and Thornton upon the importance of watching both functions. As much as they are now convinced that chloroform administered by inhalation produces death in the lower animals (for example, dogs) chiefly by primarily arresting the respiration, are they also satisfied, from clinical observation and from the results of their experimental research, that *both the respiratory and circulatory functions should be watched at the same time*. In the main, however, the results obtained by Randall and Cerna corroborate those of Hare and Thornton, and it is certainly worthy of note that one series of experiments carried out on the Atlantic coast should be confirmed by another series of experiments performed in the far southwest under entirely different climatic conditions.

Alessandri <sup>921</sup> <sub>June 16, '04 ; Sept. 22</sub> <sup>2</sup> draws attention to the fact that in most cases the effects of chloroform on the kidneys are practically *nil*. In patients with renal affections, however, this condition of perfect safety cannot be said to exist, and the author urges very strongly the necessity of carefully observing the urinary secretion for one or two days after the administration of the chloroform. When renal lesions are actually in existence, chloroform should either be avoided or at least given with the greatest caution. Prolonged or

repeated anæsthesiæ are, in such cases, unjustifiable. J. F. Heymans and D. Debuck<sup>288</sup><sub>Apr. 1, '04</sub> have found that chloroform increases, in the rabbit, the elimination of urea, of phosphates, and of the chlorides. The authors also believe that it enhances the activity in the secretion of urea, phosphates, and chlorides in the tissues themselves.

J. G. MacWilliam<sup>2</sup><sub>June 2, '04</sub> has determined the manner in which chloroform brings about the variations in the cardiac rhythm. He finds in cats and rabbits the same two stages in the effect of chloroform on the cardiac rhythm observed in man, namely, a stage of acceleration followed by a stage of slowing. These two stages are still manifest after the accelerator nerves are divided. The acceleration, therefore, is not due to impulses reaching the heart by the accelerator nerves. After the vagus nerves are divided, with or without the division of the accelerators as well, the rapid heart-beat consequent on the removal of the restraining action of the vagi can still be slowed down by the action of chloroform, but this is not preceded by any further quickening. The stage of acceleration, therefore, is due to the fact that the chloroform more or less paralyzes the inhibitory action of the vagi. That slowing is produced after the vagi are divided, although less markedly than when they are intact, shows that the slowing is not entirely due to stimulation, reflex or direct, of the cardio-inhibitory centre. It is further shown that the slowing is not due to the stimulation of the local inhibitory mechanism of the heart, for the administration of atropine, which paralyzes this mechanism, does not prevent the production of slowing by chloroform. MacWilliam's researches, therefore, give additional proof of the direct action of chloroform on the heart. He concludes this part of his work by saying that it appears that chloroform acts on the heart and distinctly slows its rate of beat through a depressing or retarding influence exerted on the intrinsic rhythmic mechanism of the organ. The author then discusses the relation of the rate of beat to the blood-pressure and the influence of the direct and reflex stimulation of the cardiac nerves. Reflex acceleration is not due to impulses that reach the heart by the accelerator nerves, for it may be readily obtained after these are divided, provided that the vagus nerves are intact. Muscular exertion causes acceleration of the heart partly by diminishing the influence of the

vagi. Animals with great running and staying powers have a slow pulse, usually markedly restrained by the inhibitory centre, and so capable of rapid acceleration by inhibition of that centre. This is strikingly seen when the effects of the division of the vagi in the rabbit and hare are compared. In the rabbit removal of the vagous influence produces but little change in the rate of beat, while in the hare the pulse may rise from 64 to 264, showing the marked action of the cardio-inhibitory centre and the consequent power of rapid acceleration of the heart in the latter.

*Chrysophanic Acid*.—T. Lauder Brunton and S. Delépine, of London, <sup>2047</sup> state that chrysophanic acid is an hepatic stimulant and produces at the same time a marked increase in the glycogen of the liver.

*Cinchona*.—An experimental investigation to determine the actions of quinine, cinchonine, cinchonidine, and conchinine upon the isolated heart of the frog and upon arterial pressure in the rabbit was undertaken by C. G. Lantesson. <sup>273</sup> Large doses of quinine and cinchonidine killed the batrachian heart in a few minutes; no such effects were observed from the administration of similar quantities of conchinine and cinchonine. In these instances the heart was able to resume, after a time, its normal condition. Under small and medium doses there was a diminution of the frequency and volume of the pulse. The toxic action of these alkaloids is developed in a rapid manner, attaining its maximum in from two to twenty minutes. The absolute force of the heart is always diminished by quinine. The author attributes these effects to an indirect action of the drugs upon the myocardium. In regard to the rabbit it was found that these alkaloids produce, in sufficiently-large amounts, a fall of the arterial pressure and a diminution in the frequency of the cardiac contractions.

*Cinchonidine*.—See Cinchona.

*Cinchonine*.—See Cinchona.

*Conchinine*.—See Cinchona.

*Cupreine*.—According to the studies of E. Grimaux <sup>296</sup> <sup>80</sup> cupreine, subcutaneously administered, produced, in dogs, rabbits, and guinea-pigs, a local anæsthesia at the point of injection, this effect lasting for several days, but no tremors or any other convulsive phenomena were observed. For guinea-pigs the fatal

dose varied from 250 to 300 grammes (8 to 9½ ounces), or double that of quinine.

*Curara*.—A variety of curara from New Granada, S. A., has been investigated by Joseph Tillie, of Edinburgh, <sup>277</sup><sub>Oct., '93</sub> who finds the drug to act as a general muscle poison. The results obtained from experiments on frogs are thus summarized by the author: 1. Rapid and absolute paralysis of the muscle of the heart, the respiration continuing. 2. Absolute paralysis and rigidity of the skeletal muscles at a much earlier period than happens in the case of an animal whose circulation has been artificially arrested. 3. Exemption of the motor nerves from paralysis until after death and until the muscles show signs of poisoning. The minimum fatal dose in the frog (*R. temporaria*) was determined to be about 0.000013 gramme ( $\frac{1}{50000}$  grain) per gramme (15½ grains) of body-weight of the frog, the experiments being performed at a temperature of from 70° to 77° F. (21.1° to 25° C.). In a single experiment upon a rabbit the effects produced were markedly different from those caused by ordinary curara. With the New Granada poison the motor weakness only appeared near death, but there was a marked action on the heart, as well as an early total paralysis of muscles and onset of rigidity.

*Duboisine*.—E. Marandon de Montyel, of Paris, <sup>164</sup><sub>Nov. 16 to Dec. 14, '93</sub> in a study of the physiological action of duboisine, from a therapeutic stand-point, concludes as follows: The time at which the various physiological effects of the drug manifest themselves, their duration, and their persistence have offered some diversities worthy of mention; the modification of the dynamometric force, of sensation, of the reflexes, and of the temperature have been early and persistent. They appeared immediately after its administration, re-appearing at each successive dose and continued for three or four hours. The effect upon the secretions, though more tardy in appearance, was of longer duration. On the day after the drug was taken the patients complained of dryness of the throat. In certain cases vertigo and hallucinations of sight were of regular occurrence, causing them to refuse to submit to the medication. Happily, these cases were exceptional. The sedative effect of the drug is, at the same time, the most persistent and the one of which the patient first acquires a tolerance. Sometimes it has lasted during the entire period of its administration, while, again, the



tolerance of it has become so great as to resist the largest doses. Of 22 cases, in which the calmative effects were at first decided, a tolerance was acquired in 8, or 37 per cent. In 2 of these this took place in 4 days, in 3 in 6 days, and in 1 not until after the lapse of 12 days. In such cases the sedative action of the drug may be restored by ceasing its continuous administration and lengthening the interval between the doses. The most tardy effect of the drug and the most tenacious is its action upon the stomach, manifesting itself first by anorexia, later by vomiting and loss of flesh.

*Dulcin*.—From experiments on cats, Kobert <sup>319</sup><sub>Apr. 21, '94</sub> <sup>80</sup><sub>July, '94</sub> has shown that doses of dulcin corresponding to such as would be used in man are harmless. With very large doses the cats become ill and eventually die with cerebral symptoms. The drug seems likewise to be harmless to rabbits, but in dogs, which are more susceptible to the action of dulcin, the evidence is somewhat conflicting.

*Echidnase*.—See Snake-poison.

*Echidnin*.—See Snake-poison.

*Echidnoxin*.—See Snake-poison.

*Electricity, Action of, on the Pneumogastrics*.—Rockwell <sup>59</sup><sub>Feb. 24, '94</sub> reported the case of a child in which respiratory and cardiac failure from chloroform occurred during an operation. A faradic apparatus being at hand, one pole was applied immediately at the junction of the clavicle and the outer border of the sterno-cleido-mastoid muscle, and a vigorous current administered. Evidences of returning vitality were seen almost immediately, and within a few minutes the heart was again beating regularly. The question arises whether or not the return of heart-power was the result of the faradism. It has been claimed that in chloroform narcosis electricity will do more harm than good, since it tends to stimulate still further the inhibitory function of the vagus. According to the author's experience, however, the ordinary external applications affect the inhibitory fibres of the vagus that go to the heart far less than they affect the accelerating fibres which, in a great measure, constitute the branches that supply the respiratory organs. The effects of faradism in sustaining respiration in opium poisoning are well known. In one case of opium narcosis, narrated by the author, the respirations were increased from two or three a minute

to eight per minute by the use of electricity. In chloroform narcosis, of course, a different condition of things prevails. The heart is under sedation, and any increase in the inhibitory effects of the vagus might be dangerous. Fortunately, there is little danger of this in the use of the induced current; at least, in ordinary precutaneous applications. Von Ziemssen has determined, by careful experimentation, that induced currents have absolutely no influence on the frequency or force of the cardiac contractions, and from that fact the erroneous conclusion has been drawn that induced currents were valueless in threatening death from heart-failure. The facts are that electricity does good in increasing the respiratory activity, the strength of current necessary for the purpose being insufficient to materially interfere with the movements of the heart through its action on the inhibitory fibres of the pneumogastric which control it. Shradly reports the case of a boy where death was imminent after the use of chloroform. Respiration ceased, and the pulse could not be felt; but through prolonged artificial respiration the life of the patient was saved. This confirms the report of the Hyderabad Commission, that it is of primary importance to keep track of the respiration in administering chloroform; if this is kept up, the heart will give no trouble.

*Ether.*—George B. Wood, of Philadelphia, <sup>112</sup><sub>Sept., '04</sub> has published an interesting study on the elimination of ether and its relation to the kidney. His experiments were made on dogs, the ether being administered chiefly by inhalation. From the results obtained the author seems to have proved that ether exists as such in the free state in the blood; and yet, coming, as it must, in close relation with the kidney, it is, contrary to previous opinions, not excreted by that organ to any appreciable amount. Nevertheless, it has been demonstrated that in ether anæsthesia the kidney becomes congested, and on microscopical examination the cells show cloudy swelling. The cells of the convoluted tubules are primarily affected, the tufts and collecting tubules only evincing change when the anæsthesia had been prolonged. Repeated administration of ether, if kept up long enough, would probably cause desquamation of the epithelial cells. Then, again, according to the author, the local effect of ether must be very deleterious to an already diseased kidney, for any unhealthy organ will not

stand wear and tear like a normal one. In cases where uræmic poisoning was commencing to make itself apparent, it was shown that there existed a liability to sudden death during ether narcosis, through the action of ether on the already-depressed centres of respiration. From the general results obtained in his investigation the author believes that, in cases of nephritis, ether should be given only with the greatest care, continually watching for any signs of failure of the respiration; that the ether should be given gradually, and when, during anæsthesia, it is necessary to use more ether, the inhaler should not at once be put directly on the face, but brought gradually closer, the anæsthetizer carefully watching the patient's breathing.

*Ethyl-nitrite*.—See Nitrites.

*Ethylene-guaiacol*.—See Guaiacol.

*Ethylic Alcohol*.—See Alcohol.

*Exalgin*.—After a series of experiments, Combemale <sup>181</sup><sub>Oct. 27, '93</sub> concludes that exalgin has a definite, but extremely slight and temporary, local anæsthetic effect.

*Extracts of Muscle*.—See Animal Extracts.

*Fluoric Acid*.—It is generally believed that fluoric acid exercises injurious effects on digestion; but the experimental researches of Hubner <sup>54</sup><sub>p. 163, '94</sub>; <sup>15</sup><sub>July, '94</sub> have shown that the substance under consideration exerts a more powerful digestive action than hydrochloric acid.

*Guaiacol*.—Pio Marfori <sup>80</sup><sub>Mar. 15, '94</sub> has investigated the physiological actions of the substitution products of guaiacol. According to his studies, the general action of the monatomic compound radicals is that of paralysis after a short period of excitement. The toxicity diminishes from methyl-guaiacol to ethyl-guaiacol, and to allyl-guaiacol, which is but slightly active. No convulsions are produced, as in the case of guaiacol itself, which contains one hydroxyl, and particularly with pyrocatechin, which contains two hydroxyls. There is, therefore, a gradual transformation in the action of these substances by the substitution of the alcohol radicals for the hydroxyls, to which may be attributed the convulsant properties. The ethyl group gives to ethyl-guaiacol its hypnotic properties. All these derivatives, in doses of 0.25 gramme (4 grains) per kilogramme ( $2\frac{1}{5}$  pounds) of the body-weight, produce a slight reduction of temperature. With the same dose guaiacol

itself, and especially pyrocatechin, act very decidedly. In regard to the arterial pressure, the results obtained may be explained by the hypothesis that an hydroxyl imparts to the molecule the property of diminishing the pressure (pyrocatechin), the methyl ( $\text{CH}_3$ ) that of elevating it (methyl-guaiacol). The other two alcohol groups, indifferent in themselves, influence the arterial pressure when they take the place of the action of the hydroxyl. Methyl-guaiacol (or veratrol) is changed in the organism, in great part into guaiacol, and is eliminated by the urine in the form of guaiacol-sulphuric ether; a small portion passes unaltered through the kidneys. Ethyl-guaiacol is also eliminated as guaiacol-sulphuric ether. Allyl-guaiacol is not much changed, and is found as such in the urine. The general action of the biatomic radicals is that of paralysis. The methylene-guaiacol and the ethylene-guaiacol are less poisonous than the trimethylene- and the propylene-guaiacol. Benzoyl-guaiacol, which belongs to the aromatic series, is transformed in the organism, partly into guaiacol, which passes into the urine in the form of guaiacol-sulphuric ether. Being inodorous, insipid, and non-caustic, it may be recommended as a substitute for guaiacol itself.

*Hæmogallol.*—See Iron.

*Hydrazine.*—According to D. Baldi,<sup>409</sup>  
v.19, p.420, '93 the hydrochlorate of hydrazine is a poison to the frog when administered in milligramme doses. It causes at first depression of the heart, followed by slow respiration, paralysis, and death. The action of the drug is centric. In higher animals the effects upon the nervous system become more marked. Upon the dog, hydrazine produces true epileptic attacks. Applied on the cerebral cortex, the agent causes a crossed unilateral epilepsy. The author states that the toxic action is due neither to the formation of methæmoglobin nor to a nitrous-acid oxidation. He admits an aldehydic condition of the protoplasm of the organs upon which hydrazine acts, since its combining readily with the aldehydes and the acetones is a characteristic property of the drug under consideration.

*Iodic Acid.*—From a special research upon the digestive properties of iodic acid, Hubner<sup>54</sup>  
p.163, '94; <sup>15</sup>  
July, '94 asserts that iodic acid, contrary to the general belief, has digestive properties, though feeble.

*Iodide of Mercury.*—See Iodine.



*Iodide of Potassium.*—The effects of iodide of potassium upon the blood have been studied by T. V. Ishumin, <sup>2050</sup><sub>No. 120, '94</sub> <sup>6</sup><sub>Sept. 8, '94</sub> of St. Petersburg. He examined the blood of fifteen patients and four healthy persons before and after taking the drug. The effect of the medicament in doses of from 15 to 30 grains (1 to 2 grammes) a day on non-syphilitic patients and on healthy individuals is, during the first two or three days of its administration, to increase the number of young corpuscles and to diminish the number of overmature white corpuscles in the blood, and, at the same time, to increase the number of those breaking up. As to the total number of corpuscles per cubic millimetre, the effect of the iodide appears to be to cause an increase, but a slight one. Administered to syphilitic patients, the iodide produces an increase in the number of overmature elements and a decrease of the immature white corpuscles and those which are breaking up. In an experimental study of the galvanolitic-cataphoric influences on the eye, Schoeler and Albrand, of Wiesbaden, <sup>80</sup><sub>Aug. 15, '94</sub> found that the cataphoresis of potassium iodide through the eyeball produces changes in the interior of the eye which are different from those observed in galvano-puncture, and are to be distinguished from those developed by simple galvanic current, as well by the value of the caustic action as by their greater intensity.

*Iodide of Sodium.*—See Iodine.

*Iodine.*—T. Lauder Brunton and S. Delépine, of London, <sup>2047</sup><sub>No. 334, '94</sub> have found that the iodide of sodium exerts a stimulating action on the liver, causing at the same time a marked increase in the amount of glycogen and a diminution in the quantity of free iron in the organ. The remarkable results obtained by Holmes and Cunningham, in the local treatment of goitre in India by the use of the red iodide of mercury in the form of ointment, are believed by Dawson Turner, of Edinburgh, <sup>2</sup><sub>June 16, '94</sub> to be due to a physical action of iodine. The author explains the results by the fact that a simple solution of iodine in bisulphide of carbon will quench the visible rays of the sun, but will transmit the invisible heat-rays. The solution is remarkably transparent to the heat-rays; it is diathermanous. According to Holmes and Cunningham, the action of the ointment employed was much intensified by exposing the patients to the direct rays of the sun. The fact that the red iodide was so efficacious sustains this theory, because the red substance

would also serve to transmit chiefly the heat-rays. The solar radiation would be filtered by the application, and the gland would be subjected to the full blaze of the calorific rays without the vibration of its molecules being interfered with by the visible rays. Should this suggestion as to the mode of action of iodine be found to be correct, the author believes that it would be wrong to cover up diseased parts to which iodine has been applied; on the contrary, such diseased parts should be exposed freely to the sun's rays.

*Iron.*—A. B. Macallum <sup>178</sup><sub>Apr. 17, '94</sub> studied the absorption of iron in the animal economy. It will be remembered that some clinicians, especially in Germany, do not believe that iron is absorbed from the gastro-intestinal tract, the good effects of the drug being attributed to an influence exercised by the iron preparations upon the mucous membrane, by which the absorption of food is enhanced. It has been maintained by Bunge that the only action exerted by inorganic iron, given medicinally, is the neutralization of the sulphuretted hydrogen, the large quantity of this gas met with in anæmic individuals being the result of imperfect digestion. On the other hand, it is held by some investigators that iron is absorbed. Thus, for example, Stockman has published a series of experimental observations in support of the latter view. He has shown that iron preparations, injected subcutaneously, cure chlorosis, this method of administration doing away with the idea of a local action on the mucous membrane; he has further demonstrated that sulphide of iron will cure chlorosis, and that bismuth, which absorbs sulphuretted hydrogen as readily as does iron, exercises no influence in the disease mentioned. In his interesting research Macallum furnishes further evidence in favor of the absorption of iron. In his experiments the author employed guinea-pigs, kittens, and other animals. These were fed with different preparations of iron, in various doses. After killing these animals at varying intervals, the intestines, spleen, liver, and kidney were placed in alcohol for hardening purposes. Sections of these tissues were subsequently treated with a mixture of hydrochloric acid and ferrocyanide of potassium, or glycerin and ammonium sulphide. The smallest trace of iron is shown in the microscopical section examined by a blue or black color, according to the reagent employed. In well-fed animals the iron is found deposited in leu-

cocytes beneath the epithelium of the tips of the villi, and a few iron-charged leucocytes are sometimes met with between the epithelial cells. The iron is detected only at the pylorus and from seven to ten inches lower down. When peptonate, chloride, or phosphate of iron are given in large amounts, the drug is observed over the whole length of the small intestine. Iron-holding leucocytes are found in the spleen also, and from these results it would appear that inorganic salts of iron are absorbed by the epithelium and transferred to other cells and tissues, and finally carried to the liver and elsewhere. The author believes that when small doses of iron are given some absorption of the drug may take place at once, but when the chyme containing iron becomes mixed intimately with the bile and pancreatic juice the iron is precipitated. If the iron is in excess of the amount which can be thrown down by these alkaline secretions, and, subsequently, by the sulphuretted hydrogen contained in the bowel, it passes onward and is absorbed by the intestine lower down, for all the villi are capable of absorbing it. There is no evidence that iron is taken up by the cæcum or upper part of the colon. It seems probable that the iron is diffused in the cells and tissues in the form of an albuminate, and that it probably acts as a stimulant to the tissues. The iron does not seem to be accumulated in the liver, though this accumulation was noticed in an animal that had been fed on the sulphate of iron. What becomes of the iron absorbed was not determined. The author concludes his work as follows:

1. The experiments on the administration of inorganic compounds of iron to guinea-pigs and other animals have resulted in showing that the intestinal mucosa absorbs these to an extent which varies with the nature of the compound and with the quantity of it given. When the dose is small, absorption occurs only in that part of the intestine adjacent to the pylorus, and measuring only a few inches in length; yet, when the quantity given at any time is large, the absorptive area may embrace the whole of the small intestine. In the former case the result appears to depend on the complete precipitation, as hydroxide, of the iron of the salt unabsorbed, in the thoroughly-mixed chyme, bile, and pancreatic juice; and, in the latter case, the large amount of the iron salt, apparently, first destroys the alkalinity of these fluids, the excess of the salt unaffected and remaining in resolution then undergoing ab-

sorption. 2. The intestinal epithelial cells transfer the absorbed iron at once to the underlying elements when the quantity absorbed is small, but with a large amount absorbed the epithelial cells are found to contain some of it. 3. Though some of the subepithelial leucocytes of the villi appear to carry part of the absorbed iron into the general blood-circulation, probably the more important agent in the transference of the inorganic iron from the villi to other parts of the body is the blood-plasma. 4. Marfori's albuminate and the commercial "peptonate" of iron, when administered to guinea-pigs, seem to stimulate the leucocytes to invade the epithelial layer of the intestinal villi. 5. Of the organic iron compounds belonging to the "chromatin" class, that present in egg-yolk (hæmatogen of Bunge) undergoes absorption in the intestine of the guinea-pig and of *Amblystoma*. In these, but more especially in the latter, after they are fed with egg-yolk for several days, the cytoplasm of the liver-cells yields marked evidence of the presence of an organic iron compound belonging to the "chromatin" class, and derived from the yolk fed. 6. The mode of absorption of yolk "chromatin" is obscure, but the process appears, in some way, to be connected with the absorption of the fat with which the iron compound is closely associated in yolk.

By numerous experiments on animals, A. Samoiloff <sup>21</sup> <sup>814</sup>  
V.19, p.87, '94; May 1, '94 has found that with soluble saccharated oxide of iron, intra-venously injected, and oxychloride of iron by the rectum, only fractions of a milligramme of the fluid are absorbed out of several grammes of the metals ingested. The experiments with hæmogallol, on the other hand, proved this drug to be exceedingly absorbable. In comparing the amount of iron deposited in the liver and eliminated in the urine, the author found the following figures: With the saccharated oxide of iron, 0.034 per cent.; with iron oxychloride, 0.087 per cent.; with hæmogallol, 23.61 per cent.

*Iso-amyllic Alcohol*.—See Alcohol.

*Iso-butyl-dichloramine*.—Iso-butyl-dichloramine, according to the studies of Boinet and Berg <sup>46</sup>  
Aug.15, '94 causes asphyxia, accompanied with pulmonary congestion and hæmorrhages. It also produces somnolence, stupor, and pronounced muscular paresis, especially of the inferior extremities.

*Iso-ethyllic Alcohol*.—See Alcohol.

*Iso-quinoline*.—See Quinoline.



*Lepidine*.—See Quinoline.

*Liver, the Action of, on Poisons*.—In a series of investigations with curare and the virus of diphtheria, to determine the poison-destroying action of the liver, Fagari <sup>537</sup><sub>July, '94</sub>; <sup>2</sup><sub>Aug. 25, '94</sub> found that, though certain neutral powers are exercised by the organ, they are probably identical with those inherent in other tissues. These powers seem to be those of elimination rather than of a transformation.

*Lobeline*.—In a series of investigations with lobeline, P. Aubert, of Lyon, <sup>211</sup><sub>Dec., '93</sub> has studied the action of this alkaloid on the sweat-glands. He finds that at first lobeline causes an increased secretion of the sudoriferous glands, these effects lasting from five to six minutes. This increase is followed by a decrease, which, although not so pronounced as that produced by atropine, lasts for several hours. The author believes that the contradictory evidence so far presented by physiologists and clinicians can be explained by this varied action of lobeline on the sudoriparous glands.

*Mercury*.—From the results of a series of experiments with the bichloride of mercury on the blood-corpuscles of the lower animals, E. Maurel, of Toulouse, <sup>14</sup><sub>Nov. 22, '93</sub> states that the leucocytes of the rabbit are much more sensitive to the disintegrating action of the drug than are the red corpuscles. The author further believes that the noxious effects on the animal itself and on the corpuscles bear no constant relation the one to the other. These latter results appear to confirm those previously obtained by the same author from similar studies of the corpuscles of human blood.

*Methyl-nitrite*.—See Nitrites.

*Methylene-chloride*.—According to J. F. Heymans and D. Debuck, <sup>288</sup><sub>Apr. 1, '94</sub>; <sup>80</sup><sub>July, '94</sub> methylene chloride increases, in the rabbit, the elimination of urea, of phosphates, and of the chlorides. The investigators also believe that the drug enhances the activity in the secretion of urea, phosphates, and chlorides in the tissues themselves.

*Methylene-guaiacol*.—See Guaiacol.

*Morphine*.—Experiments to determine the nature of the work of the kidneys, under the action of morphine, are published by W. H. Thompson. <sup>178</sup><sub>Dec., '93</sub> The results obtained led the author to believe that morphine diminishes the quantity of urine, causing even a temporary arrest of the secretion; that it diminishes the

total and percentage quantities of urea even more markedly than does atropine; that the alkaloid of opium increases the excretion of the "unknown" nitrogen; and, finally, that while diminishing the blood-pressure, the effects of the drug upon the secretion of urine cannot be wholly attributed to this cause. Regarding the excretion of morphine, hypodermatically injected, Rosenthal<sup>4</sup> <sup>866</sup><sub>No. 49, '93; Mar., '94</sub> arrives at the following conclusions: 1. Morphine, even if given in minimal therapeutic doses, is excreted in the saliva in considerable quantities. Its identification is comparatively easy if the administration has continued for several days. 2. The time in which this excretion takes place cannot be determined, by the usual methods, in patients who have received therapeutic doses; the proportion of that excreted in the saliva to the amount administered can only be estimated. 3. Morphine undoubtedly accumulates in the body and is excreted gradually. 4. The positive results of tests for the presence of morphine and its quantitative estimation in the gastric contents allow no absolute or reliable estimate, either of its presence or the quantity present, unless the absence of saliva from the stomach can be confirmed. 5. The author desires to call especial attention to the practical value of the examination of the saliva for the presence of morphine in cases suggesting intoxication by this drug.

*Naphthol*.—A. Rovighi<sup>1169</sup> <sub>p. 572, '93</sub> has determined the fact that naphthol considerably increases the elimination of sulphuric ether by the urine.

*Nitric Acid*.—Nitric acid is said by T. Lauder Brunton and S. Delépine, of London, <sup>2047</sup><sub>No. 334, '94</sub> to act as an hepatic stimulant, and to cause a diminution in the amount of free iron in the liver, and sometimes, also, a lessening of glycogen.

*Nitrite of Amyl*.—See Nitrites.

*Nitrites*.—Following the researches of Leech on certain nitrites, noticed in the last issue of the ANNUAL, is the one by J. Theodore Cash and Wynham R. Dunstan, <sup>90</sup><sub>June, '94</sub> made during the past year. These investigators utilized the nitrites of the paraffin series, which are these: Methyl-nitrite,  $\text{CH}_3\text{NO}_2$ ; ethyl-nitrite,  $\text{CH}_3\text{CH}_2\text{NO}_2$ ; primary propyl-nitrite,  $\text{CH}_3\text{CH}_2\text{CH}_2\text{NO}_2$ ; secondary propyl-nitrite,  $(\text{CH}_3)_2\text{CH NO}_2$ ; primary butyl-nitrite,  $\text{C}_2\text{H}_5\text{CH}_2\text{CH}_2\text{NO}_2$ ; secondary butyl-nitrite,  $\text{C}_2\text{H}_5\text{CH}_3\text{CH NO}_2$ ; tertiary butyl nitrite,  $(\text{CH}_3)_3\text{CNO}_2$ ; iso-primary butyl-nitrite,

$\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}_2\text{NO}_2$ ;  $\alpha$ -iso-primary amyl-nitrite,  $\text{CH}(\text{CH}_3)_2\text{CH}_2\text{CH}_2\text{NO}_2$ ;  $\beta$ -iso-primary amyl-nitrite,  $\text{C}_2\text{H}_5\text{CH}(\text{CH}_3)\text{CH}_2\text{NO}_2$ ; tertiary amyl-nitrite,  $\text{C}_2\text{H}_5(\text{CH}_3)_2\text{CNO}_2$ . The actions of these substances on the muscular tissue, on the circulation, especially the pulse and the blood-pressure, and on the respiration, were carefully studied. On the *muscular tissue* the action of the nitrites was marked, especially when the muscle was placed in a closed chamber containing the vapor of the nitrite. There occurred spontaneous shortening of the muscle, this passing finally into a state of rigor. While under the influence of the drug, stimulation of the muscle showed a gradual diminution in the height of the contraction, until the rigor state was reached, when the muscle failed to respond to stimulation. The drug acted more rapidly the higher the temperature at which the experiment was performed. In regard to the *circulation*, the nitrites examined were found to increase the rapidity of the pulse, this phenomenon accompanying or succeeding the fall of the blood-pressure. The arterial pressure was always lowered, this depression being more marked after inhalation than after intra-venous injection. The fall of pressure was found to be due to direct peripheral action on the arterioles. As to the *respiration*, this appeared to be retarded at first, and afterward accelerated in most, but not in all cases. The authors, from the results of their experimentation, conclude as follows: In respect of all phases of the physiological action, the secondary and tertiary nitrites are more active than the corresponding primary compounds. This is to be chiefly attributed not to the direct physiological effect of the secondary and tertiary groups, but to the great facility with which these compounds suffer decomposition. In respect of the acceleration of the pulse, the power of the nitrites varies directly as their molecular weights, and they therefore fall into an order identical with that of the homologous series. The same relationship, increase of activity, corresponding with rise in molecular weight, may also be traced, though less uniformly, in their power of reducing blood-pressure and of inducing muscular contraction. This order appears to be the result not so much of the direct influence of the substituted methyl groups as of the increased chemical instability which their substitution confers on the higher members of the series. In respect to the duration of subnormal pressure, as

well as of the rapidity with which muscular contraction occurs, the activity of the nitrites is expressed by an order which is, for the most part, the reverse of that representing their power in accelerating the pulse, reducing blood-pressure, and contracting muscular fibre, this order being, in general, contrary to that of the homologous series. In these respects the more volatile nitrites of low molecular weight, and containing, therefore, relatively more nitroxyl, are the more active. It is probable that these simple nitrites more readily attach themselves to constituents of blood and muscle, and thus act more quickly than the higher compounds in inducing muscular contraction, whilst their greater stability causes their effect—*i.e.*, reduction of blood-pressure—to endure for a greater length of time than that of the higher and more easily decomposed bodies. These results of Cash and Dunstan appear to more or less corroborate those of Leech.

G. Marinesco<sup>90</sup> studied the influence of nitrite of amyl on the circulation, and details experiments made on rabbits after division of the cervical sympathetic and great auricular nerves. The drug was administered by inhalation, in very large quantities. This was followed by a diminution of the congestion of the ear of the operated side, *pari passu* with flushing of the ear of the intact side. It appeared to produce a vascular dilatation in more than one way, since the dilatation was no longer the same in both ears. The author, therefore, concludes that nitrite of amyl does not act on the peripheral vessels exclusively, but causes vasomotor dilatation also, through another channel. This, however, is not definitely proven by Marinesco's experiments, and the subject is worthy of further investigation.

*Nuclein.*—Chemically, the nucleins are proteid bodies containing a large amount of phosphorus, existing in the form of nucleinic acid, this acid being the same in all nucleins; but, combined with different bases, give the different resulting nucleins. On reduction and recomposition they yield some of the so-called xanthin bodies. In general the nucleins are insoluble in dilute acids and soluble in dilute alkalies, and resist peptic digestion. In an interesting paper on the subject of nuclein, Victor C. Vaughan, of Ann Arbor, Mich.,<sup>2048</sup> expressed the belief that for immunity and cure of infectious diseases we must look for (1) non-poisonous germicides of cellular origin and (2) substances which simply stimulate



the activity of those organs whose function it is to protect the body against those diseases. He thinks that nucleins fill both of these demands. Referring to the investigations of Huber, the writer states that (1) the subcutaneous injection of nuclein increases the number of white blood-corpuscles; (2) this increase occurs in both healthy and tuberculous persons; (3) the increase varies with the individual; (4) the increase is mostly in the polynuclear cells; (5) it generally appears within three hours and disappears after forty-eight hours.

*Onion.*—Alfred K. Pilacki, of St. Petersburg, <sup>2050</sup><sub>No. 83, '93</sub> studied the physiological actions of onions on metabolism. His observations were made on healthy men. The species of onions used were the *Allium ascalonicum* and the *A. cepa*. The daily doses employed varied from 100 to 150 grammes ( $3\frac{1}{4}$  to  $4\frac{3}{4}$  ounces) of the bulbs. All the articles of food, as well as the urine and fæces, were carefully analyzed, and the nitrogen determined by the method of Kjeldal-Borodin. The author arrived at the following conclusions: 1. Under the influence of onions in the said quantities, the assimilation of nitrogen invariably decreases, the diminution oscillating between 0.16 and 12.81 per cent., and averaging 3.59. The depression persists during the after-onion period, sometimes even attaining higher readings. 2. As a rule, the nitrogenous metabolism similarly sinks. During the onion and after-onion periods the system loses nitrogen in lesser quantities than those it has assimilated. Whether the retained nitrogen is utilized for building up stable proteid substances remains yet to be elucidated. 3. The proportion of underoxidized products in the urine is, as a rule, diminished during both the onion and after-onion stages. In other words, the nitrogenous metamorphosis shows a qualitative improvement. 4. The daily quantity of the urine mostly increases. 5. The bodily weight in four cases rose, in the other four it sank.

*Orthotolu-quinoline.*—See Quinoline.

*Oxygen.*—J. L. Kerr, of Crawshawbooth, Manchester, <sup>6</sup><sub>Sept. 30, '93</sub> gives an account of the results obtained in two healthy persons from inhalations of oxygen. Breathing the gas in a confined space, so as to inhale as little natural air as possible, and taking deep inspirations, it was found that there was no flushing of the face or feeling of quickened vitality, as was shown by the absence

of any exhilaration; there was no quickened rate of the pulse, and, as far as could be judged, not the slightest rise in temperature. The only positive result noticed was a distinct diminution in the frequency of the respiration. The intervals between the respiratory acts were greatly increased, and there was a feeling that there was no urgency to repeat it; the necessity to breathe was entirely abolished for the time being. As far as the author could ascertain, the lengthening of the respiratory intervals balanced the increased supply of oxygen to the lungs, and, therefore, to the blood, in an automatic manner. Part of these observations were made on the author's own person.

*Ozone*.—W. Gilman Thompson, of New York, <sup>59</sup><sub>Mar., '94</sub> has carefully studied the physiological action of the ozone preparations. From the results obtained in a series of experiments on dogs the author concludes as follows: 1. When injected in the circulation in full strength,—i.e., 15 volumes per cent.,—they have a very destructive action upon the blood, thereby ultimately having the effect of reducing rather than of oxidizing agents for the tissues. 2. Acting through the stomach or intestine, they may similarly affect the blood, and in addition they destroy the gastric and intestinal mucous membrane. 3. Given in medicinal doses by the stomach, their only benefit, if any, consists purely in their local action in the alimentary canal, in possibly preventing abnormal fermentations. 4. If so used, care should be exercised, owing to the great variability in strength of different preparations. 5. Ozone is of no real value to the tissues, whether inhaled or drunk in fluid preparations, and it may be exceedingly harmful. In an experimental study of ozone administered by inhalation to dogs, Peyrou <sup>14</sup><sub>May 30, '94</sub> has observed that the agent increases the elimination and probably the formation of urea.

*Papain*.—Dott <sup>744</sup><sub>Mar. 10, '94</sub> found that papain has only a slight solvent action on albumin at the temperature of the body, and practically no peptonizing action. On the other hand, pepsin has a high power both of dissolving albumin and peptonizing the solutions. The higher temperature of 130° F. (54.4° C.) increased the rapidity both of the solving and peptonizing power of pepsin, and likewise increased the solvent power of papain.

*Paramidophenol*.—According to the observations of O. Hinsberg and P. Treupel, <sup>273</sup><sub>B.33,p.216</sub> paramidophenol, in doses of 0.50

gramme ( $7\frac{3}{4}$  grains) acts as an antineuralgic and antipyretic, in the same manner as similar quantities of antipyrin, phenacetin, or antifebrin. No secondary symptoms are manifested. Poisonous effects are only noticed in the lower animals after large intravenous amounts, these effects being the production of methæmoglobin, renal irritation, vomiting, diarrhœa, fall of the arterial pressure, and paralysis of the lower extremities. Aceto-paramidophenol has also rapid antipyretic properties. The authors state that the antipyretic power is inversely proportional to the number of ethylic radicals introduced into the body under study. When the H of the radical OH is replaced by the ethylic radical, the maximum of the antineuralgic and narcotic power is obtained by the replacement on the methylic radical of the hydrogen combined with the nitrogen, while the maximum of the antipyretic action is obtained by this replacement being made by the methylic or ethylic radical.

*Paratolu-quinoline*.—See Quinoline.

*Pental*.—T. E. Constant <sup>6</sup><sub>Apr. 23, '94</sub> has made a series of observations regarding the effects produced by inhalations of pental. He affirms that in the majority of cases the drug produces the following phenomena: Almost immediately the pental is inhaled there are noticed slight flushing of the face and quickening of the pulse, the increased frequency being unaccompanied by any diminution of the force. The respiration, if quiet at the beginning of the inhalation, becomes deep and rapid when the handle of the inhaler is turned full on, but becomes quieter when turned off. The eyes, if closed, open as the patient becomes anæsthetized, and have a fixed and a staring look. The conjunctival reflex is rarely lost, although in some cases it disappears after four or five inspirations. In a few instances there is profuse perspiration after about thirty seconds. The duration of the anæsthesia produced is on the average of about one and a half minutes, but varies greatly with the patient and the character of the respiration, never being less than a minute nor more than three; there is no muscular relaxation. The author has observed dangerous symptoms, and reports three fatal cases occurring under the administration of pental. He, however, for short operations, prefers this drug to nitrous oxide or to a mixture of nitrous oxide and ether.

*Pepsin*.—See Papain.

*Peptone*.—The actions of peptone and propeptone on the circulation form the subject of a research by J. E. Abelous.<sup>410 5</sup>  
No. 1, p. 53, '94; June, '94  
His conclusions are summarized as follows: 1. Peptones retard the coagulation of the blood. 2. They determine a temporary arrest of urinary secretion. 3. After a more or less prolonged period of agitation they determine a particular narcosis—a peptonic narcosis. 4. The peptones finally produce a lowering of blood-pressure and a dilatation of the abdominal vessels. A series of carefully-conducted experiments on curarized dogs and on the isolated heart of the tortoise shows that both substances have an analogous and manifest action upon the circulation. They determine a temporary, more or less long, marked fall of the arterial pressure, this being coincident with the dilatation of the abdominal blood-vessels. This vaso-dilatation is in part reflex and in part due to the action of the ingested substances upon the nervous centres. It is often, but not always, observed after injection and after a diminution of the frequency of the cardiac rhythm, and that in spite of a simultaneous lowering of blood-pressure. The change of rhythm then can be attributed to a double origin: (a) excitation of the bulbar cardiac regulatory centre, or (b) direct action upon the intra-cardiac slowing apparatus.

*Phenacetin*.—This drug, according to A. Rovighi,<sup>1169</sup>  
p. 572, '93 increases the elimination of sulphuric ether by the urine when given in doses of from 1.50 to 2 grammes ( $23\frac{1}{4}$  to 31 grains).

*Phenocoll*.—It has been found by A. Rovighi<sup>1169</sup>  
p. 572, '93 that phenocoll, in doses of from 1.50 to 2 grammes ( $23\frac{1}{4}$  to 31 grains), increases the elimination of sulphuric ether by the urine.

*Phenol*.—T. Lauder Brunton and S. Delépine,<sup>2047</sup>  
No. 334, '94 of London, found that phenol exercised a depressing action on the liver, causing a diminution in the glycogen and an increase of iron.

*Pilocarpine*.—In a special research to determine the changes produced in the liver-cells by the action of drugs, T. Lauder Brunton and S. Delépine, of London,<sup>2047</sup>  
No. 334, '94 found that pilocarpine stimulated glandular activity, this effect being accompanied sometimes by a diminution in the amount of glycogen, and probably also of iron.

*Propyl-dichloramine*.—According to Boinet and Berg<sup>46</sup>  
Aug. 15, '94 propyl-dichloramine produces, especially in mammals, asphyxia with pulmonary congestion and hæmorrhages. In the frog the nervous



symptoms are the most pronounced. It is the only dichloramine which causes phenomena of motor excitability rapidly followed by stupor and paraplegia. It is also the dichloramine that causes the least congestion of the nervous centres.

*Propyl-nitrite*.—See Nitrites.

*Propylene-guaiacol*.—See Guaiacol.

*Quinaldine*.—See Quinine.

*Quinethyline*.—The phenomena produced by this medication, according to E. Grimaux,<sup>296</sup> are the same as those caused by quinine, but more marked,—analgesia, especially of the leg experimented upon; stupor, bilateral tremors, depression of the temperature from 1° to 2° C. (1.8° to 3.6° F.). A dose of 0.15 gramme (2¼ grains) caused death in a guinea-pig weighing 400 grammes (12¾ ounces).

*Quinine*.—From a study of the subject of quinine amblyopia, Claiborne<sup>1</sup><sub>June 30, '04</sub> arrives at the following conclusions: 1. Quinine in toxic doses may produce blindness. 2. The toxic dose is distinctly indeterminate. 3. The duration of the amaurosis varies largely. 4. The field of vision remains contracted. 5. Central vision usually returns to the normal. 6. There is color-blindness at first; the color-perception is ultimately restored within the central field. 7. The ophthalmoscopic picture is that of white atrophy. 8. Experiments on dogs show that there is atrophy of the entire optic tract. 9. The same experiments show that the cells of the cuneus are probably not affected. It is stated by A. Rovighi<sup>1169</sup><sub>p. 572, '03</sub> that the bisulphate of quinine, in doses of from 1.50 to 2 grammes (23¼ to 31 grains) diminishes the elimination of sulphuric ether by the urine.

*Quinoline*.—Ralph Stockman, of Edinburgh,<sup>178</sup><sub>Sept., '03</sub> publishes an interesting account of experiments performed to determine the physiological actions of quinoline, iso-quinoline, and some of their derivatives. From the results of the experiments made on frogs and rabbits he could observe no appreciable difference between the actions of quinoline and iso-quinoline: 0.0025 gramme (½<sub>15</sub> grain) of the tartrate of either alkaloid was sufficient to cause marked spinal depression in frogs, the animals recovering after some hours. Larger quantities depressed both the brain and the spinal cord, this effect being followed by a slight exaggeration of the reflexes. The heart and the motor nerves are affected only

by very large quantities of the drugs in question. In rabbits about 3 decigrammes of either tartrate, hypodermatically administered, produced a slow respiration and a trifling fall of the temperature; higher doses—1 to  $1\frac{1}{2}$  grammes ( $15\frac{1}{2}$  to  $23\frac{1}{4}$  grains)—caused more or less collapse, marked nervous depression, and a great fall of the temperature. Both heart and respiration were then greatly slowed. Quinoline methiodide and iso-quinoline methiodide exercised similar actions, but their effects on the termination of the motor nerves were more marked from the point of view of paralysis. In frogs 0.005 gramme ( $\frac{1}{12}$  grain) of these substances produced marked depression of the spinal cord, followed by increased reflex activity, and larger amounts caused a marked paralyzing action on the ends of motor nerves, this effect masking the other phenomena somewhat; 0.03 to 0.05 gramme ( $\frac{1}{2}$  to  $\frac{7}{8}$  grain) produced death in rabbits, from paralysis of the motor nerves, accompanied with general collapse and marked fall of the temperature. The physiological action of quinaldine ( $\alpha$ -methyl-quinoline), lepidine ( $\gamma$ -methyl-quinoline),  $\alpha$ - $\gamma$ -dimethyl-quinoline, orthotolu-quinoline, and paratolu-quinoline was also examined by the same author. All these substances produced similar effects to those of quinoline, but less marked. Stockman, therefore, believes that, in the quinoline molecule, the position of the nitrogen atom or of the radical methyl does not exert any appreciable influence on the physiological action of these substances, and, further, that the substitution of  $\text{CH}_3$  for H only slightly alters its action, and that only in degree, not in kind. It is improbable, he further states, that the derivation of a more complex alkaloid from quinoline or iso-quinoline, respectively, is in any way a factor which determines its action, seeing that these two substances have exactly similar actions.

*Quinopropyl-ine.*—The action of this drug has been studied by E. Grimaux. <sup>296</sup>  
<sub>July 8, '94</sub> In doses of 0.025 gramme ( $\frac{2}{5}$  grain) it produced, in a guinea-pig weighing 400 grammes ( $12\frac{3}{4}$  ounces), a lowering of the temperature of  $2^\circ \text{C}$ . ( $3.6^\circ \text{F}$ .) in fifteen minutes, and of  $5^\circ \text{C}$ . ( $9^\circ \text{F}$ .) in the course of two hours. This thermic depression was accompanied with bilateral tremors, inco-ordination of movements, collapse stupor, and somnolence. A few days afterward the same animal succumbed to a dose of 0.05 gramme ( $\frac{7}{8}$  grain), death being preceded by epileptiform convulsions.

Quinopropyl line is probably about four times as poisonous as quinine.

*Red Iodide of Mercury*.—See Iodine.

*Salicylic Acid*.—A. Rovighi <sup>1169</sup><sub>p.572,'93</sub> has studied the elimination of sulphuric ether by the urine under the action of certain anti-pyretics. He has found that salicylic acid and the salicylate of sodium at first slightly increase the sulphuric-ether elimination, but this diminished to a marked degree in two or three days after the administration of the drugs.

*Salol*.—A. Rovighi <sup>1169</sup><sub>p.572,'93</sub> affirms that salol increases considerably the elimination of sulphuric ether by the urine.

*Selenium*.—According to the researches of E. Czapeck and J. Weil, <sup>273</sup><sub>B.32,p.433,'93</sub> selenium resembles arsenic and tellurium in their physiological action. Selenium, the authors claim, acts as a depressant to the circulation, producing a diastolic arrest of the heart of the frog and a fall of the arterial pressure in warm-blooded animals. It also causes paralysis of the central nervous system.

*Snake-poison*.—C. J. Martin, of London, <sup>178</sup><sub>Nov., '93</sub> describes some effects upon the blood produced by the injection of the venom of the Australian black-snake, the *Pseudechis porphyriacus*. He found in general that the poison caused an increase in the coagulability of the blood; but this transient positive phase was succeeded by a negative phase, for blood drawn three minutes after the injection either failed to clot at all or did so only after the lapse of several hours. This negative phase lasted for a long time. The results of Mitchell and Reichert, in regard to capillary hæmorrhages, were confirmed by Martin. This author arranged the mesenteries of cats and dogs under the microscope, so as to obtain a good view of the circulation in the capillaries. A minute portion of the poison was then placed near the portion of the mesentery in the field of the microscope. In a few minutes, without any previous clouding of the field or stasis, small hæmorrhages appeared. These tiny hæmorrhages increased in number and extent until the whole field was one mass of corpuscles. The observer believes that the venom first damages the capillary wall and that the pressure within causes an actual solution of continuity, the blood escaping through this rupture. Regarding the coagulability of the blood, Martin advances the hypothesis that such phenomena following the injection of snake-venom are *identical*, especially as

to their immediate causation, with those described by Wooldridge as consequent upon the injection of "tissue-fibrinogens."

Phisalix and Bertrand, of Paris, <sup>Feb. 14, '94</sup><sub>14</sub> studied the toxicity of the blood of two species of adder commonly met with in France. The blood, collected with antiseptic precautions from the heart of the ophidians, was injected into guinea-pigs either at once or after being kept in a cool place for twenty-four hours, the serum only being utilized in the latter case. The result was always uniform and differed in no particular from the results obtained from the inoculation of echidnin (venom of viper),—that is, hypothermia, progressive paresis ending in collapse without loss of sensation, weakening of the heart-beats, and generalized vaso-dilatation with visceral congestions and ecchymoses. There exist, therefore, in the blood of the adder, poisonous principles analogous to echidnin, insoluble, like the latter, in alcohol and very adherent to precipitates. In order to determine the origin of these principles, organic extracts were prepared from the liver, pancreas, spleen, thymus, thyroid body, and salivary glands, especially the superior labial glands. Introduced into the peritoneal cavity of guinea-pigs, all, excepting the extract of the salivary glands, were found to be inoffensive. The salivary gland was highly active. The poisonous symptoms produced by this gland-product were identical in character and severity with those caused by the blood and serum of the same animals. It is evident that the immunity enjoyed by the adder in respect to the viper's venom (echidnin) is due to the fact that the continual secretion of an analogous poison by the superior labial glands constitutes an auto-inoculation which is protective. The authors believe to have determined the existence of a second substance in the venom of the adder, besides that of *echidnoxin*, the more active of the two. That secondary substance they name *echidnase*, which, in its pathogenic action, is compared to certain forms of diastase.

*Sodium Iodide*.—See Iodine.

*Sodium Salicylate*.—See Salicylic Acid.

*Sparteine*.—David Cerna, of Galveston, Texas, <sup>Apr. 1, 15, '94</sup><sub>814</sub> reviews the work of previous investigators, and then describes in detail his own experiments on the physiological actions of sparteine on frogs and dogs. The following conclusions are given: 1. Sparteine causes a brief period of increased muscular irritability. 2. The



drug increases reflex action by directly influencing the spinal cord. 3. Reflex action is afterward depressed by sparteine; first, through a primary stimulation of Setschenow's reflex inhibitory centre, and, secondly, by influencing the cord directly. 4. The convulsions produced by the drug, generally of a tetanic nature, are of a spinal origin. 5. The paralysis caused by the medicament is similarly the result of an action on the medulla spinalis. 6. Sparteine increases both the rate of the pulse and the force of the heart. The acceleration of the heart's action is soon followed by a distinct decrease of the same. 7. The primary increase in rate is due to an action on the heart itself. 8. The subsequent decrease in the rapidity of the pulse is of double origin,—a direct cardiac action and stimulation of the cardio-inhibitory centres, centrally and peripherally. 9. The enormous increase in size of the pulse-curves is probably the outcome of a direct influence on the cardiac muscle. 10. Sparteine increases the blood-pressure by an action on the heart, and also by stimulating the central vasomotor system. 11. The subsequent fall of the arterial pressure under the drug is likewise the result of a double action,—paralysis of the vasomotor apparatus and a depressant cardiac influence. Cardio-inhibitory stimulation, through the vagi, is possibly a third factor in the causation of reduced pressure. 12. Both the increased number of the respiratory movements and the secondary depression of the same are due to a direct action on the respiratory centres in the medulla oblongata. 13. Sparteine kills generally by respiratory failure. 14. Sparteine may be classed as a decided cardiac stimulant, its range of action being similar to that of digitalis.

*Strontium*.—Cesare Falcone<sup>589</sup><sub>No. 206, p. 651, '93</sub> has investigated the action of strontium salts, especially the nitrate, the tartrate, and the lactate, and found that the first salt mentioned did not produce any anatomical changes on the kidneys, even after a prolonged administration. On the other hand, the neutral tartrate caused a certain degree of renal congestion. The lactate was found still more active. The results of a series of experiments showed that this latter salt produced a diminution in the amount of urine excreted, accompanied with a gradual increase in the amount of albumin. The continued administration of the drug resulted in the production of an initial form of nephritis, proved by a microscopical

examination of the urine and of the renal substance. The experiments were made on dogs.

*Strychnine*.—The action of strychnine upon the pancreas has been investigated by D. N. Agricolansky.<sup>586</sup><sub>No.44,'93</sub> <sup>2</sup><sub>Apr.7,'94</sub> The drug was administered to dogs with an artificial pancreatic fistula, and it was found that: 1. When given in considerable doses—0.002 gramme ( $\frac{1}{32}$  grain) and more per kilogramme ( $2\frac{1}{5}$  pounds) of the animal's weight—the nitrate of strychnine markedly inhibits the pancreatic secretion, the latter ceasing altogether in from ten to thirty minutes after the administration; subsequently, however, the inhibitory effects slowly cease. 2. Smaller amounts either produce no impression whatever, or may even slightly increase the secretion. 3. There is no definite relation between the general physiological action of the drug and its inhibitory influence on the gland. 4. Qualitative changes of the juice are but slight and inconstant, and, when present, seem to be caused rather by alterations in the concentration of the juice than by the action of the drug on the formation and secretion of the pancreatic ferments. 5. In the presence of small quantities of strychnine in the juice, saccharification of starch proceeds more extensively than under the ordinary conditions, while the proteid digestion remains unaltered. When present in a large proportion, the drug retards the digestion.

*Sugar*.—The influence of sugar on muscular effort has been carefully investigated by Vaughan Harley.<sup>178</sup><sub>P.1,'94</sub> In the first place, he found, by experiments on the muscles of the middle finger, that, in corroboration of a well-known physiological fact, regular exercise caused increase in the size of the muscles brought into play, and at the same time, up to a certain point, rendered them capable of performing more work. Sugar, if taken internally, proved to be a muscular food; since, when taken into an empty stomach, there was on that day an increase of 25.6 per cent. in the work done by the left middle finger, while the right middle finger showed an increase of no less than 32.6 per cent. The author gave the sugar in many different ways, but always with the same result: the vigor of the muscles was always increased.

*Tellurium*.—The action of tellurium, according to F. Czapeck and J. Weil,<sup>273</sup><sub>B.32,p.438,'93</sub> resembles that of arsenic and selenium. Tellurium is asserted to cause a diastolic arrest of the batrachian

heart, to diminish the blood-pressure in warm-blooded animals, and to paralyze the central nervous system.

*Tetrachloride of Carbon*.—See Carbon Tetrachloride.

*Thiourea*.—Paul Binet<sup>197</sup><sub>Oct.20,'93</sub> has investigated the actions of thiourea upon the lower animals. The drug is represented by the formula:—



The author finds that the substitution of an atom of oxygen by an atom of sulphur, in the molecule of urea, results in the formation of thiourea, conferring to this latter body toxic properties. These toxic properties consist in a depression of the central nervous system and a progressive weakness of the heart. Upon the frog the motor paralysis, of centric origin, may be preceded by a short period of tetanus. The cardiac viscus is arrested in diastole. After death of the animal the muscles and nerves retain their excitability. In mammals death takes place from collapse, with gradual lowering of the temperature. No spectroscopical alterations could be noticed in the blood.

*Tobacco*.—Vaughan Harley,<sup>178</sup><sub>p.1,'94</sub> has studied the influence of tobacco on muscular effort. From the results of his experiments the author considers that moderate smoking, in one accustomed to it, neither increases the amount of work nor retards the approach of fatigue. The agent, perhaps, slightly diminishes the muscular power and hastens the onset of fatigue.

*Toluene*.—According to the researches of T. Lauder Brunton and S. Delépine, of London,<sup>2047</sup><sub>No.334,'94</sub> toluene acts as a stimulant to the liver, causing, at the same time, a marked diminution in the amount of free iron in the organ. The same properties were observed in toluylene-diamine.

*Trimethylene-guaiacol*.—See Guaiacol.

*Trional*.—According to the experimental studies of Otto Bakofen,<sup>6</sup><sub>Aug.25,'94</sub> trional acts more rapidly than sulphonal, the sleep lasting about an hour longer than in the case of the latter remedy. Animals did not become habituated to the trional, and only very large doses, continuously used, produced poisonous effects. No changes were produced upon the kidneys, nor was there hæmatoporphyrinuria observed under the action of the drug.

## ELECTRO-THERAPEUTICS.

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### GENERAL CONSIDERATIONS.

*Physiological Effects of Alternating Currents.*—D'Arsonval gives <sup>860</sup><sub>May 15, '94</sub> the results of his studies on nerves and muscles, from which it appears that the following laws may be regarded as established: 1. Nerve excitability is brought into play especially by the rapidity and extent of the variation of the potential. The quantity of the current plays a secondary rôle. 2. Muscle excitability is brought into play by the quantity of the current and the height of variation of the potential,—i.e., the physical energy of the excitation. 3. Alternating currents with sinusoidal variation do not produce a sharp shock on the system. With low frequency they give neither pain, muscular contraction, nor electrolysis, and their influence on the economy consists in an increase in the absorption of oxygen and the elimination of carbonic acid. Gradually increased, they provoke energetic contractions; but these, by reason of the regularity of the current, while of equal intensity, are much less painful than the contractions from the induced current. By this means the gaseous exchange can be increased one-fourth without ill effects. Hence it is very useful in diseases of perverted nutrition (gout, obesity, rheumatism, etc.), as practiced by Gautier, Larat, and Bouchard

A short comparison of the effects of this and other modes of electrization is instructive. 1. The continuous current does not show any immediate or appreciably objective influence on nutrition. 2. Franklinization increases respiratory combustion, but in a less intense manner than sinusoidal currents. 3. Ordinary faradization with a very feeble, non-sinusoidal, alternating current



can increase respiratory combustion without pain, but with a strong non-sinusoidal current produces a fatal electrical tetanus. The causes of death by alternating currents are (1) arrest of respiration, producing asphyxia, and (2), following the first, cardiac arrest by elevation of temperature. Hence, in many cases the death is only apparent, not real.

In experiments with the currents mentioned d'Arsonval produced currents of great frequency and electrization by means of autoconduction. He used the resonator of Hertz, which can give up to one thousand million vibrations a second. That such a current has an influence on the organism is shown by its action on an interposed incandescent lamp. It is known that these

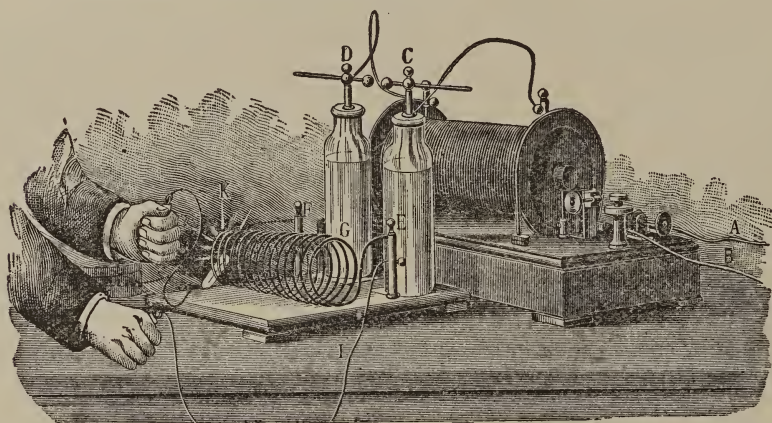


FIG. 1.—METHOD OF OBTAINING CURRENTS OF GREAT FREQUENCY AND FEEBLE INTENSITY. (D'ARSONVAL.)

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alternating currents are distributed especially on the surface. How account, then, for the induced currents exhibited in the organism, especially in the nervous centres? D'Arsonval does this by a theory attributing to different nerves different modes of excitation by which they are found in unison with electric waves only for vibratory periods comprised in fixed limits. Above and below these limits no electrical irritation will take place. If this is so, there are limits for each class of nerves, and this is exactly the result of his experiments. He makes use of an apparatus for obtaining currents of great frequency and feeble intensity (Fig. 1).

A continuous current of great intensity (*A* and *B*) puts in

play a Ruhmkorff coil; the two ends of the coil lead to the internal armatures (*D* and *C*) of two Leyden jars; the external armatures (*E* and *F*) of these jars are united, and by the solenoid (*G*), and by the cord (*I*), in the circuit of which is interposed the incandescent lamp (*K*) and the body of the operator. This apparatus may be used with entire safety.

The theory of induced currents in the tissues is supported by the experiment illustrated in Fig. 2.

The operator holds between his arms the solenoid attached to

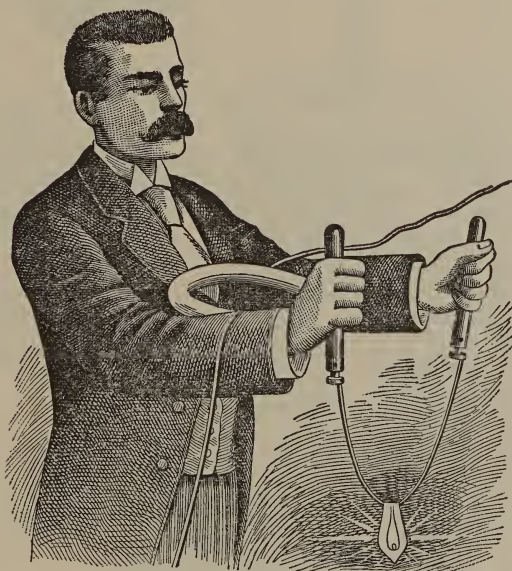


FIG. 2.—PRODUCTION BY INDUCTION OF CURRENTS OF HIGH FREQUENCY IN THE HUMAN BODY. (D'ARSONVAL.)

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the current of high frequency. The current induced in his arms by the vicinity of the solenoid is sufficient to render incandescent a lamp completing the circuit formed by the arms.

In the same manner the whole body may be inclosed in a large solenoid and subjected to the action of the current. It has been found that the vasomotor system is most highly influenced, an increased respiratory combustion taking place, as is shown by the increased heat-radiation, without, however, any rise of body-temperature. This result was obtained by the very ingenious calorimeter (Fig. 3).

The subject stands in the axis of a large solenoid surrounded by a woolen cloth. The top is of wood, with a projecting funnel to which is attached a registering anemometer. When no current is passing the radiated heat of the body causes only a very slight

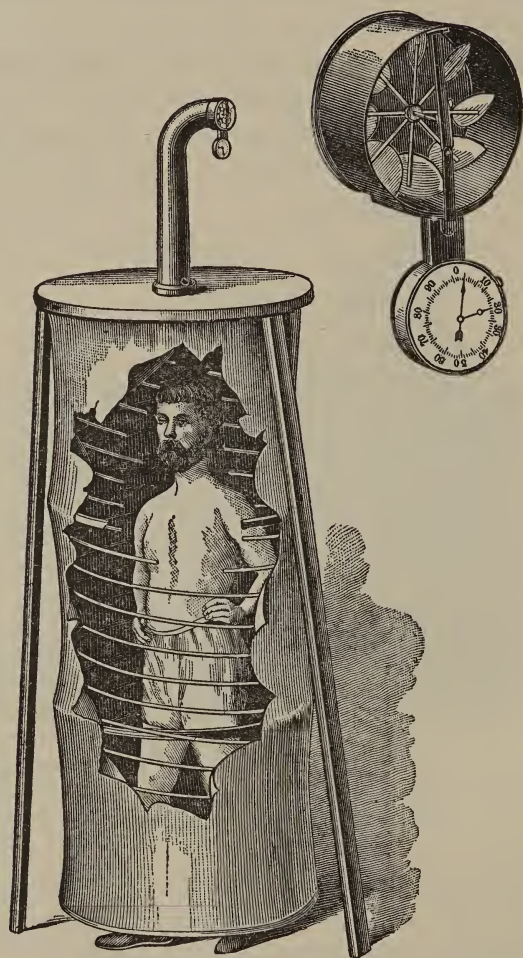


FIG. 3.—APPARATUS FOR CLINICAL CALORIMETRY. (D'ARSONVAL.)

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rotation. When the current is passing the rotation is increased, with a constant relation between the number of rotations and the quantity of heat disengaged, the latter being proportionate to the square root of the number of rotations. There is a large field for the application of this principle to the practice of clinical



calorimetry, and in order to render it practical in the treatment of various diseases, especially those of malnutrition, d'Arsonval has devised a bed (Fig. 4).

*Experiments with the Galvanic Current.*—H. A. Hare, of Philadelphia, <sup>80</sup><sub>Dec. 15, '98</sub> details an experiment apropos of the discussion on galvanizing the brain. The fact being admitted that electricity always flows in the direction of least resistance, the problem to be solved was simply whether the roundabout route by the scalp or the more direct one through the head from side to side offered the most resistance. The positive pole of the battery was applied to

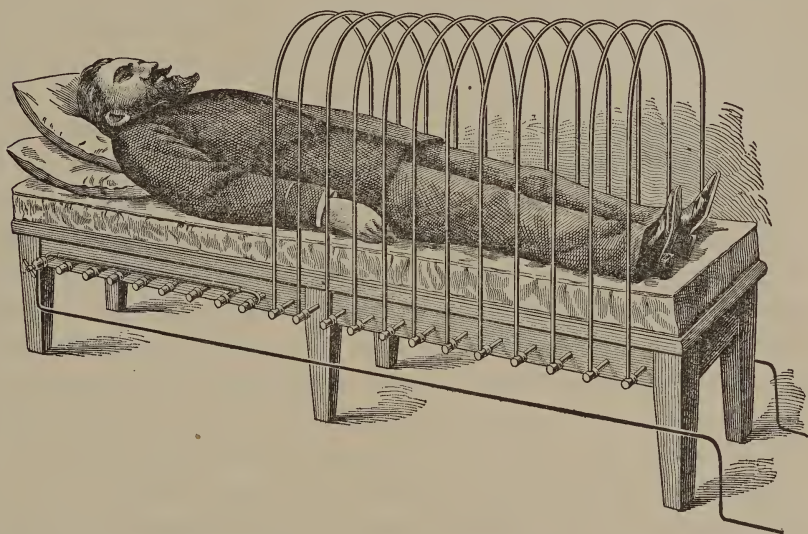


FIG. 4.—BED FOR THE PRACTICE OF ELECTRIZATION BY AUTOCONDUCTION. (D'ARSONVAL.)

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the occiput and the negative to the forehead of a large dog, and a milliampèremeter placed in the circuit now registered  $5\frac{3}{4}$  milliampères. The dog was then trephined. The milliampèremeter still in the circuit, a needle, thoroughly insulated except at its tip, was inserted into the brain-substance, being attached, of course, to one of the poles. The milliampèremeter now registered  $3\frac{3}{4}$  milliampères. In other words, the resistance to the current, when one of the poles was bare metal and in the middle of the brain, was greater when the current had to pass through the wet sponge, bone, membranes, and scalp than when the current had to pass from pole to pole by the scalp. "If this is the case," asks the author, "how much greater



must the resistance be when the current has to pass through both sides of the skull instead of only one side, as in my experiment? If the current passed through and through, as is believed by some persons, the patient would be thrown into a convulsion through excitation of the motor cortex every time the current was made or broken, and any one who has applied the feeblest of currents to this motor area will appreciate the fact that very powerful motor impulses are excited by this means. The benefit must be obtained indirectly, and not by the direct effect of the electrical current on the cranial contents."

*Per contra*, Deve<sup>760</sup><sub>Jan. 27, '94</sub> reports the following experiments, which seem sufficient to prove that electricity acts perfectly within the central portion of the brain. Upon the head of animals about to be killed two electrodes were placed at the ends of the biparietal diameter and a current of 60 milliampères passed between them. Two galvano-puncture needles, insulated to within five millimetres of their points, were connected with an astatic galvanometer, thus forming a secondary circuit. This done, these needles, now positive and negative, were plunged into the scalp into the following positions. The primary current was 60 milliampères: 1. They were plunged into the bipolar line, five centimetres from each electrode, when the meter of the secondary circuit after one minute registered 14 milliampères. 2. They were separated from each other on this line four centimetres,—1 to 11 milliampères showing. 3. The distance between them was doubled,—1 to 5 milliampères. 4. The positive needle in place, the other was introduced into the occipito-frontal line,—1 to 2 milliampères. 5. The needles being introduced at opposite points of this occipito-frontal diameter, a current still passed, shown by oscillations of the indicator needle, which were increased by interruptions of the primary current, but it was incapable of measurement. Having obtained these results, openings were made in the cranium corresponding to the previous positions of the needles, through which they were plunged into the brain, it being evident that they would show a secondary current if the primary had traversed the scalp, bone, and brain. Besides, the small amount of insulated surface of the needles and their extreme thinness made it easy to localize exactly where they picked up the primary flow. Now, no matter how deeply they were introduced into the cerebral substance, the recorded current

was the same, as follows: 1. Eight milliampères. 2. Six milliampères. 3. Four milliampères. 4. Two milliampères. 5. Too small to be appreciable.

Finally, the brain being laid bare and divided longitudinally and the needles laid upon the surface, one centimetre apart, upon gray matter, the secondary current amounted to 17 milliampères; at the same distance, upon white matter beneath, 15 milliampères. The primary electrodes during this experiment were in direct contact with opposite convolutions.

From these experiments the following conclusions were drawn: 1. The current passes through scalp, bone, and encephalon. 2. It is stronger in the scalp, and grows weaker by diffusion, the more rapidly when electrodes are removed farthest from the biparietal line. 3. It spreads itself evenly through the entire encephalic mass. Nevertheless, assuming that gray matter is a better conductor than white, it is probable that electrical intensity is greatest in the cortical layers. Then, taking for granted the storage of electrical energy, we can schematically represent the head by a sphere on the surface of which is found the thickest part of a layer of fluid, the thinnest nearest the centre, while the middle layer will correspond to the gray cortical matter. The greatest resistance to the passage of electricity was found in the inner table of the skull.

J. Mount-Bleyer and M. Milton Weill, of New York, <sup>2014  
Sept. 12, '98</sup> give the results of some interesting experiments on the action of the galvanic current on the blood, showing that it increases the amount of ozone. According to these authors, Kühne concluded that the red corpuscles greedily absorb ozone under the natural formation of carbonic acid and decompose water as free oxygen is liberated.

The oxygen in the blood exists in two forms: First, that which is held in solution by the plasma; second, that which enters into combination with the constituent elements of the corpuscle, or oxyhæmoglobin. This oxyhæmoglobin is given up as soon as the oxygen of the plasma has become exhausted and the pressure reduced, as in the capillaries. This interchange continues until the pressure of the oxygen in the lymph equals that of the oxygen in the plasma. The galvanic current facilitates this transfer. In the preliminary tests the atmosphere was shown to

be free from nitrous compounds by the Gries-Slosvay formula, and from ozone by the iodide-of-starch and tincture-of-guaiacol tests; 60 grammes (2 ounces) of blood were then taken from a rabbit and defibrinated. The serum showed ozone in small quantity, the clot in far greater amount. After galvanization the clot showed more vivid and longer reactions. This was due to the polarization of the neutral oxygen. This polarization of the oxygen seems to take place just as the gas touches the tissues where the conditions are favorable to such an action and where it closes circuit with electricity in the human frame. This leads to the theory that oxygen in the blood, stimulated by the polarizing power of animal electricity, and more so under the stimulus of the galvanic current, enters into combination with the hæmoglobin of the corpuscles, with a partial transformation into ozone, and that in loosing its combining bonds it undergoes a further partial transformation into ozone.

Experiment was then made on the living animal; 40 milliamperes from two 24-cell Edison-Lalande batteries were passed through a rabbit. At the end of five minutes both carotids were cut through and 35 grammes ( $1\frac{1}{8}$  ounces) of blood were drawn into a sterilized glass vessel and defibrinated as before with sterilized glass rods. It was observed that the blood was of a brighter scarlet hue than that which flowed from the arteries of the unelectrified animal. Exposure to the air while the process of defibrination was going on did not affect the bright tint. The defibrination, too, was not so easily affected and the fibrin slowly gathered around the rods.

The ozone tests, after seven minutes, showed more immediate and deeper tints; and after twenty minutes, being compared with the papers of the first experiment, showed a deeper and more permanent color, both for the serum and the clot. The ozone was estimated to be three times as great as in normal blood.

From these experiments the authors deduce the theory that animal electricity not only influences the whole system of nutritive operations, but directs them, and hence is the precedent factor in chemical action and nutrition.

*Conduction of the Body in Normal and Other States.*—An important study on the conduction of the body under normal as well as physiological and psychical conditions has been made by

d'Arman, <sup>996</sup><sub>Aug. 25, '94</sub> who concludes that, as a rule, the conductivity increases with the potential. To this there are certain exceptions where the law is inverted, and others where the resistance diminishes proportionally to the potential. Except for the palms of the hands and soles of the feet, the conductivity augments for about twelve minutes, and especially for the first two minutes of the application, from 50 to 90 per cent. The resistance diminishes by increasing the surface of the electrodes and the quantity, saturation, and temperature of the saline solution. It is greatest in the limbs, less in the neck and trunk, and least in the face. It varies according to the subject and the disease. It is greater in exophthalmic goitre, alcoholic mania, idiocy, melancholia, chorea, unilateral nervous affections (neuritis, amyotrophica, hemiplegia, hemianæsthesia), and infantile paralysis. It is very feeble in hysterical conditions, especially when combined with alienation; epilepsy, mania, neurasthenia, and tetanus. After an inversion of the current the resistance diminishes. That of bone- and nerve-tissue is such that a current of 5 to 10 milliampères applied on the vertebral column has only an intensity of  $\frac{4}{1000}$  to  $\frac{20}{1000}$  milliampère.

*Bactericidal Action of the Continuous Current.*—Burci and Fraseani make a contribution to this subject. <sup>996</sup><sub>Aug. 10, '94</sub> By means of U-tubes the action of nascent iodine, obtained from iodide of potassium by electrolytic action, was studied. With a current of 5 to 10 milliampères in fifteen to thirty minutes the iodine from the positive pole killed both streptococci and staphylococci. In rabbits inoculated in the ear with experimental erysipelas no result was obtained when the erysipelas had been well developed, but if the current were applied immediately the pathological phenomena were retarded and rendered less intense.

The constant current, of medium intensity, had no effect with sterilized water nor with salt solution, but with a solution of iodide of potassium, 10 per cent., and a current of 100 milliampères, a better result was obtained.

*Recovery After Apparent Death from Electrical Shock.*—In view of the interest excited by the discussion of electrical executions in America, a case reported by d'Arsonval, of Paris, <sup>14</sup><sub>May 2, '94</sub> is of great interest. The patient, a telephone-wire man, was accidentally placed in communication with a cable carrying a current of 5000 volts, of 110 interruptions, and 800 milliampères. He



remained five minutes in the circuit, and forty minutes elapsed before aid arrived. Sylvestre's method of artificial respiration was tried without result for several minutes, but when the tongue was drawn out and rhythmical movements practiced natural respiration began and the man recovered. He was an epileptic, and the question arises: What will be the effect of such energetic treatment on his epilepsy. Laborde corroborated d'Arsonval's statement as to the necessity of rhythmical lingual manipulation in such cases.

*Effect of Electricity on Muscular Nutrition.*—The influence of the different forms of electricity on the nutrition of muscles was extensively studied by Debedat, of Bordeaux,<sup>1061</sup><sub>Feb. 15, '94</sub> whose experiments were undertaken in consequence of the discussion at the Congress of Electrotherapy at Frankfort, in 1891, at which Möbius declared that the effects observed from the use of electricity were the result of suggestion. Animals were selected as not being susceptible to suggestion, and an effort was made to determine if there were any actual increase of muscular fibrillæ or any exaggeration of the special properties of muscles under the influence of the current.

A study of muscular nutrition and the relation of muscular contraction to the circulation led to the conclusion that functional inertia of muscles has a most injurious effect on their nutrition and on the general circulation. A comparison of natural exercise and that produced by electricity showed that the circulatory phenomena of muscular contraction are the same for natural and for electrical excitation. This establishes the advantages of electrical gymnastics, and shows that the effects of electricity are real, and not the result of suggestion.

#### THERAPEUTICS.

*Rheumatism.*—Massy, of Bordeaux,<sup>1061</sup><sub>Nov. 15, '98</sub> has added another to the many studies of the electrical treatment of chronic rheumatism. After a clear statement of the physiological action of the various currents, he gives an historical *résumé* of treatment and results, and points out the necessity of not using the currents blindly, but of applying each to its particular set of cases. He gives the following indications: Static current to be used for general electrization for twenty to thirty minutes by sparks or

frictions along the spine; continuous alternating current to be used either by hydro-electric method or by autoconduction. (See page C-4.)

For pains more or less severe, but always subacute, use stabile galvanization of the articulations, positive pole on the painful part, 10 to 30 millampères for ten to twenty minutes. For restricted articular movements use stabile followed by labile galvanization. For muscular pains and neuralgias in the region of the articulations, stabile galvanization followed by faradization with a metallic point and an energetic current. For muscular atrophy, continued current with negative pole, galvano-faradization, and simple faradization. For the articular pains of chronic general and nodular rheumatism, galvanism, positive pole, 15 to 40 millampères, twenty minutes. For muscular contractions begin with continued current, and if no result be obtained use faradic. There are two modes of galvanization: (a) Stabile current + pole on that portion of the cord controlling affected muscles, — pole on muscles. (b) Stabile descending current on the course of muscles and nerves; great intensity. Forty millampères for a short period. For osseous tumefaction of extremities use simple galvanism or cataphoresis, the latter being preferable with solution of iodide of potassium or other resolvent. This treatment does not exclude internal medication.

*Rheumatismal Hydrarthrosis.*—The same author <sup>188</sup><sub>Nov. 12, '03</sub> remarks on the rapidity with which the obstinate swellings of this affection may be reduced by means of galvanism. In one case there was evident fluctuation, and treatment with salicylates, etc., for eighteen months was without effect. Three sittings with a maximum of intensity of 40 millampères only were necessary for the complete disappearance of the swelling. Other corroborative cases are cited; and attention is called by the author to the fact that a higher intensity was required and could be borne in the later sittings, because the absorption of the exudate rendered the resistance of the part greater, following the law

$$I = \frac{E}{R};$$

and that the increased resistance, in turn, was clinical evidence of the progress of absorption.

*Paralyses.*—Electro-muscular examination of cases of motor paralyses led Tripier, of Paris, <sup>879</sup><sub>May, '94</sub> to the following conclusions: 1. Whatever the origin of the paralysis, electric currents act, in their variations, on contractility, a property of muscle, by reason of their intensity, and upon motion and sensibility, properties of nerves, by their tension. 2. The differences between the reactions thus excited, less apparent and more difficult to observe in a healthy subject, are characteristic in the pathological state, when there is a degree of isolation. 3. The paralyses in which voltaic currents (currents of quantity) contract muscles inactive to induced currents (currents of tension) belong to the class of spinal paralyses, as do all incomplete spinal paralyses, since in all such cases, when the muscle is still intact or has been restored, currents of tension, acting on the nerve, are without much effect, while currents of quantity, acting on the muscle, produce more energetic reactions than in the normal state. 4. The theoretical views leading to the formulation of this general law find new confirmation in what is observed in cerebral paralyses. It has been noticed that the reactions, excessive for those paralyses in which the motor nerve is excited by currents of high tension, are very much less in those paralyses affecting especially the muscle by excitations of currents of quantity. 5. The law of Marshall Hall should be thus amended: "Motor, muscular, and nervous reactions, preserved in cerebral paralyses, are especially called in play by excitations of high tension, while the degree of persistence or restoration of muscular reactions in spinal paralyses is especially revealed by the application of excitations of quantity."

Lewis Jones, of London, <sup>2</sup><sub>Mar. 10, '94</sub>; <sup>673</sup><sub>Apr.</sub> communicates the results of the electrical treatment of many cases of infantile paralysis, and formulates the following conclusions: (1) it is important in every case of infantile paralysis which has lasted over four weeks to try electrical treatment, continuing it for six months or a year; (2) it is an exception for a muscle to be so completely destroyed by poliomyelitis as to have no functional fibres left; (3) great development of the remaining fibres may be gained by persevering stimulation of them; (4) where the electrical reactions are reduced to the very lowest flicker, or even entirely abolished, some improvement may still be hoped for; (5) where the electrical relations are not altered in quality it is not good practice to leave the case to take care of

itself; (6) electricity acts only as a stimulant, but it is superior as such to any mechanical treatment by rubbing or massage, though it may advantageously be combined with these; (7) the form of electrical stimulation to be employed is of less importance than persistence in its employment; (8) the induction coil, with or without the bath, is quite easily arranged for use by the mother or nurse.

The mode of treatment of paralysis from compression of the radial nerve, advocated by Remak, <sup>720</sup><sub>Feb., '94</sub> is justified by his results in sixty-four cases, and is remarkable for its rapidity. He had recourse to weak galvanic currents, the + pole applied in the axilla and the — pole on the arm directly in the course of the radial nerve. Faradization was painful and useless in these cases. In fifty-four of the sixty-four cases the effects were immediate, and were more rapid in proportion as the treatment was instituted earlier. A reversal of the position of the poles produced an aggravation of the symptoms; 8 milliampères gave the best results. The cure was entirely independent of suggestion.

*Rodent Ulcer.*—J. Inglis-Parsons, of London, <sup>6</sup><sub>Nov. 11, '93</sub> prefers electricity to either knife or caustics in this disease, because it is more speedy, there is less liability to hæmorrhage, it is less painful both during and after application, and leaves a less deforming cicatrix. He uses two needles, with about 300 milliampères. Four cases are cited, with recovery in all.

*Xanthoma.*—Fox, of New York, <sup>245</sup><sub>Apr., '94</sub> used electrolysis in two cases. The first patient was a man with patches of xanthoma on the upper and lower eyelids, which rapidly disappeared after two introductions of the needle. In the other case a patch of xanthoma on the upper eyelid of a woman entirely disappeared after the needle was introduced five times very superficially and held for a minute. A current of  $1\frac{1}{2}$  to 3 milliampères was employed. The operation causes very slight pain.

*Exophthalmic Goitre.*—A. D. Rockwell <sup>59</sup><sub>Sept. 30, '93</sub> claims that in an experience including the treatment of forty-five cases of exophthalmic goitre, dating from 1876 to the present time, a period of sixteen years, he has been enabled to clinically study the disease thoroughly, and form an opinion as to the benefits to be derived from certain methods of treatment not altogether in accord with prevailing opinions. In short, he holds that the prognosis in this



disease is better than is generally believed; and if his results have been more satisfactory than others that have been reported, it has been due to a more rational use of electricity, the remedy which has been his main reliance, and greater thoroughness and persistency in its application. While he by no means excludes the administration of drugs in the management of this disease, they are in his hands regarded as supplementary to the chief remedy, and subject to changes according to the indications in each individual case. Some absolute failures occurred, but not many. It is rare, indeed, that through the combined method of hygiene, diet, drugs, and electricity, the disease fails to be in some degree favorably influenced, for out of these forty-five cases there were but three that received no benefit whatever, and these were not even temporarily relieved. Twenty-seven were benefited, some of them in a very great degree, others only slightly. Some of those that were much benefited relapsed and received further treatment with good results, while others have been lost sight of and their subsequent history is unknown.

In fairness, however, it must be said that, while the most persistent treatment failed to do more than slightly improve many of these cases, some of them, which otherwise possibly might have been benefited, discontinued treatment after a comparatively short period. Fourteen of these cases, which either fully or approximately recovered, are given in detail.

*Gangrene.*—Alorossoff <sup>31</sup><sub>Apr. 7, '94</sub> gives the histories of two unique cases in which the spread of gangrene of the inferior extremity was arrested by galvanism. In one amputation was decided on, but postponed at the request of the family, and galvanism resorted to with excellent results. In the other case the gangrene was not arrested after amputation until galvanism was employed.

#### THE STATIC BATH.

C. Truchot, of Clermont-Ferrand, <sup>1061</sup><sub>Feb. 15, '94</sub> has made an interesting study of the general effects of the static bath on himself, directed especially to the pulse, temperature, dynamic force, and urine. The co-efficient of oxidation was at first raised, then fell below normal, where it remained during the course of the experiments. The pulse was hastened, the temperature elevated, and the dynamometric force diminished. The appetite and sleep, both at first

accentuated, soon diminished, and, in fact, a feverish condition declared itself, which disappeared after the cessation of treatment, but left a feeling of weariness, both mental and physical, for nearly one month. He explains this by the organic combustion being hastened and not so thorough, resulting in the overproduction and accumulation of toxins, ptomaines, and leucomaines, which, in a normal state, are excreted *pari passu* with their production.

Doumer, of Lille, and Marquant<sup>31</sup><sub>Sept. 1, '94</sub> give the results of twenty-two cases of varicose ulcers treated by the static bath. The ulcer was cleansed by sublimate or other antiseptic solution and covered by a pad of hygroscopic wadding, and the positive pole from a Wimshurst of four plates, giving five sparks per second at eight centimetres, applied for ten minutes. The ulcer was then recovered with an antiseptic pad, the treatment being renewed three times a week. The nutrition of the integuments was stimulated and cicatrization hastened.

The researches of Damian and d'Arsonval have proved that franklinization exercises a very important action on nutrition. It augments the temperature and the excretion of urea and diminishes that of the phosphates. R. Vizioli<sup>996</sup><sub>Apr. 25, '94</sub> has made use of this fact in a case of tetany in a girl, aged 14 years, in whom there were as many as eighteen seizures a day. After two months of suffering she was subjected to the positive static bath. From the first sitting the seizures diminished in number, intensity, and duration; ceased finally at the seventh; the facial hyperexcitability disappeared at the tenth, and the electrical symptoms described by Erb ceased at the thirteenth. After two more treatments cure was declared and there was no recurrence.

Tripier's investigations<sup>720</sup><sub>Feb., '94</sub> on franklinism are interesting and instructive. Considering the comparative disuse of this form of electricity, he thought that it might be brought into more general use, and therefore experimented on the value of frictions with a metallic ball attached to the negative pole. His results were as follow: The patient being insulated on a stool, the inactive pole being insulated, frictions caused no sensation. The patient insulated, negative pole to the ground, very little sensation was produced. The patient on the ground, positive pole insulated, caused very strong sensations. The patient and the positive pole also on the ground, the sensations were still increased.

## ELECTRICITY AND LIGHT IN THE CURE OF INFECTIOUS DISEASES.

E. de Renzi, of Naples, <sup>596</sup><sub>Apr., '94</sub> in a remarkable paper, gives the results of his experiments on this subject. He used large electrodes, the positive bathed with 10-per-cent. solution of bicarbonate of sodium and the negative pole with a 5-per-cent. solution of tartaric acid. In general, daily sittings of one hour's duration and a current of about 50 milliampères were employed.

Fifty-one cases of pulmonary phthisis were treated with the following results: Cured, 1; notable improvement, 10; moderate improvement, 14; stationary, 15; worse, 11; death, 6.

The effects noted were: great increase in organic oxidation, body-weight, urinary secretion, and respiratory powers, and diminution in febrile movement (some exceptions) and slow diminution of bacilli in sputum (not constant). Those abandoning the treatment at once showed a notable fall. Twenty-five cases of pleuritic and pericardial exudations were treated, with complete cure in 12, great improvement in 6, and little or no result in 6.

These cases had all been previously subject to long treatment with various methods without success. The unsuccessful cases included purulent and hæmorrhagic pleuritis, one ending in carcinoma. He considers the remedy a prompt and safe one.

From the well-known action of pure air upon phthisical patients, the author believes the curative effects to be due to exposure to intense light. Adapting this theory to laryngeal phthisis, applications of solar and gas light were employed by means of the laryngoscope, under cocaine, for from five minutes to an hour.

In all the cases there were a diminution of the laryngeal pain, the aphonia, and the dysphagia, and an actual change for the better in the local appearances. The other methods consisted of the electric light and a bath in diffused light, the whole body being exposed. The electric light was found to be preferable because it is very clear, has little heat, can be used night and day, does not vitiate the air, is not accompanied by danger of fire, and is easily limited to any one region.

Baths of four lamps of 32 candle-power, under the bed-clothing, are administered for from two to six hours. In 31 observations there was an immediate and marked diminution in the temperature, pulse, and respiration. The amount of hæmoglobin and the body-weight were increased. The author, from bacterio-

logical as well as clinical experiments, believes thoroughly in the curative properties of light.

#### ELECTROLYSIS.

De Tymososki, of Nice, <sup>720</sup><sub>June, '94</sub> concludes that negative electrolysis is preferable to galvano-cauterization in diseases of the throat, on account of its greater safety, the resulting cicatrices being softer and more apt to be absorbed. Granular pharyngitis, hypertrophy of tonsils, chronic rhinitis (hypertrophic ?), laryngeal hæmorrhage, angioma of the vocal cord, and pathological remains in the glottis after ablation of tumors have all been treated with excellent results. In laryngeal tuberculosis not much can be expected.

A case of aneurism of the temporal artery, cured by platinum needles, is reported by R. Verhoogen, of Brussels. <sup>996</sup><sub>Aug. 25, '94</sub> Three of these needles were plunged into the sac and connected with the posterior pole, the negative being applied over the sternum. A current of 5 milliampères for six sittings in as many weeks sufficed to effect a cure. This method seems preferable to Gautier's, in which the copper needles are used.

Yvon <sup>14</sup><sub>June 24, '94</sub> communicates a method of treating urinary calculi by means of electrolysis. By passing a voltaic current through an aqueous solution of sodium sulphate, sulphuric acid and oxygen are disengaged at the positive pole and sodium at the negative pole, which, by secondary action, gives rise to caustic soda and hydrogen. If a urinary calculus is placed in an electrode-forceps of platinum, the blades of which are insulated, the calculus immersed in a solution of sodium sulphate, and the current passed, the calculus will crumble and dissolve at the point of contact of one of the electrodes. If the calculus be of triple phosphates or of earthy carbonates, it will dissolve at the positive electrode; if composed of uric acid, at the negative electrode. A special instrument resembling a lithotrite has been constructed for the purpose. Experimentally, outside of the bladder, this method has succeeded admirably, but it remains to be seen whether it will be equally successful on the living patient.

Ch. Faguet, of Bordeaux, <sup>70</sup><sub>Dec. 17, '93</sub> calls attention to the danger of the electrical treatment of tumors of the breast. A patient, aged 29, who had no history of hereditary cancer, sought advice as to a small, firm, superficial, glandular swelling in the right mam-



mary region, with no inflammatory symptoms. She was treated by electricity, both externally and by electrolysis, by a physician (?), with the result of rapidly increasing the size of the tumor and finally inducing ulceration of the skin, involvement of the lymphatics, and atrophy of the mammary gland. Excision was practiced by Lannelongue, and the patient recovered. The growth and the malignancy of the tumor (carcinoma) were undoubtedly determined by irritation from the electrical treatment.

#### INSTRUMENTS.

A new electrode for the utilization of currents of high tension has been devised by Rockwell <sup>1</sup> <sub>MAR., '94</sub> for the use of clay, which is the



Rear view.

ELECTRODE FOR THE UTILIZATION OF CURRENTS OF HIGH TENSION. (ROCKWELL.)

*New York Medical Journal.*

most satisfactory material in enabling us to overcome the resistance of the skin in a painless manner.

The objection to clay is that it is dirty and difficult to handle without soiling the clothes and person of both the physician and patient. To overcome this difficulty and thus render available this most useful material for general electro-therapeutical purposes, he has devised the arrangements illustrated in the accompanying cuts. These electrodes are of a non-conducting material—hard rubber—and may vary from one to five inches in diameter. The bottom of the disc is covered with block-tin. This is an important feature, since, with the strong currents used, ordinary metallic conductors

speedily become oxidized at the positive pole and their efficiency thus impaired.

Block-tin for all ordinary purposes is practically non-oxidizable. When wanted for use, the electrodes are simply filled to the edges or a little beyond with the moistened clay, permitting the application of very strong currents without any discomfort to the patient. One who has been accustomed to use only electrodes of sponge, absorbent cotton, or chamois-skin will be surprised at the strength of current it is possible to administer through these contrivances.

With an electrode of this kind, two inches in diameter, one



Front view.

ELECTRODE FOR THE UTILIZATION OF CURRENTS OF HIGH TENSION. (ROCKWELL.)

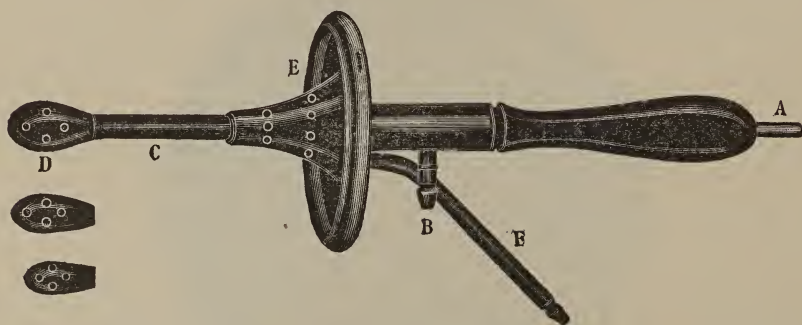
*New York Medical Journal.*

can readily bear from 75 to 100 milliampères, and, on the well-known law that the greater the area the less the resistance, we have only to enlarge our electrodes to obtain, with the same electro-motive force, an increased current-strength that is just as readily borne, since it is distributed over a larger area.

A new electrode for hydro-electric applications of the constant current has been invented by Margaret A. Cleaves of New York, <sup>59</sup> Aug. 25, '94 for the treatment of pelvic exudates, ovaritis, simple and specific vaginitis, pruritus vulvæ, and eczema of the vulva.

The external part of the electrode, shown on next page, is of

hard rubber, the handle of which is filled in with a brass rod from the point of attaching the rheophore at *A* up to the attachment of the hose of the fountain-syringe at *B*. From *B* to the end of the tube *C*, where the perforated cap, *D*, screws on, it is lined with a tube of carbon. The shield, *E*, is movable, and has two rows of perforations through which the surplus water drains into the tube, *F*. To this drainage-tube is affixed a few feet of rubber hose, of less diameter than that on the fountain-syringe through which the water or the medicated solution gains egress into the vagina, in order to retard the drainage and keep the vagina distended during the time of administration of the current. This drainage-hose is dropped into a jar at the foot of the operating-table, the syringe-hose is attached at *B*, the rheophore-tip at *A*,



ELECTRODE FOR HYDRO-ELECTRIC APPLICATIONS OF THE CONSTANT CURRENT. (CLEAVES.)

*Medical Record.*

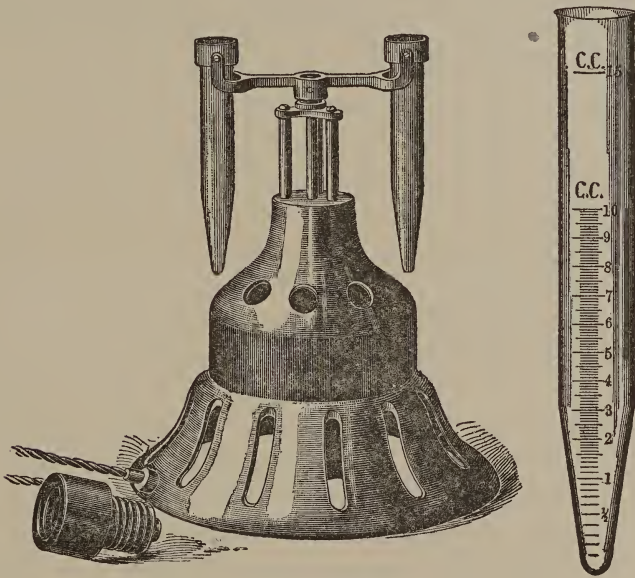
and the vagina allowed to become well distended with the water or medicated solution before the current is turned on. By firm and even pressure of the shield over the ostium vaginae, with the labia folded out, so as to occasion no discomfort to the patient, it is possible to administer any quantity of the douche, 1 to 3 or more quarts (litres), without getting a drop upon the patient's clothing.

An excellent article on the hydro-electric douche is contributed by Guyenot, of Aix-les-Bains. <sup>24</sup><sub>Aug. 12, '94</sub> His observations have been made on temperate (32° to 34° C.—90° to 94° F.) and hot (37° to 40° C.—98.6° to 104° F.) douches. The general hydro-galvanic douche is always sedative if care be taken (*a*) to increase gradually the strength of the current and to turn it off gradually before stopping the douche; (*b*) to use not more than 8 to 10 milliampères and a large rose; (*c*) not to exceed fifteen minutes'



use. In the hot douche a period of excitability always precedes the sedative effect. The maximum of effect is obtained with the positive pole and the descending current. If an interrupter is used, the sedative effect is annulled. Without interruptions the douche is proper in cases where a profound effect on the general nutrition and nervous system is desired.

The local douche is applicable in neuralgias, paralyses, after fractures and luxations, and especially functional impotence of the nerves. The hydro-faradic douche is indicated when muscular contractions and reflex nervous action are desired. The subject of



ELECTRIC CENTRIFUGE. (PURDY.)

*New York Medical Journal.*

hydro-electric douches is also exhaustively treated by Gautier and Larat, of Paris. <sup>720</sup><sub>Nov., Dec., '93</sub> An electric centrifuge is presented by C. W. Purdy, of Chicago, <sup>1</sup><sub>Aug. 18, '94</sub> for the centrifugal analysis of urine and the rapid and complete separation of sediments from fluids for microscopical purposes by means of centrifugal force. By reason of its special design and construction, the field and armature being laminated and specially wound, it can be operated by electric currents of 110 volts direct or 52 volts alternating. It is, therefore, the only motor now manufactured which will run by either direct or alternating currents without overheating. Attachment-plugs



and resisters are furnished for operating this centrifuge by any of the existing systems of electro-incandescent lighting at all desirable rates of speed for practical work. It can also be operated by the ordinary galvanic and storage currents. It is capable of a maximum speed, without tubes, of over 6000 revolutions a minute; with sediment-tubes, by means of multiple resisters on the 110-volt current, 2500 to 3500 revolutions; with tubes carrying 1 ounce (31 cubic centimetres) of urine, 1500 to 2500 revolutions a minute. The precipitating centrifugal force exerted by this centrifuge is over two thousand times greater than that of gravity, and therefore a given sediment requiring twenty-four hours to precipitate by gravity may be obtained by this apparatus in rather less time than two minutes.

# GYNÆCOLOGICAL ELECTRO-THERAPEUTICS.

By GEORGES APOSTOLI, M.D.,

AND

JULES GRAND, M.D.,

PARIS.

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## PREGNANCY FOLLOWING TREATMENT BY ELECTRICITY.

Monell, of New York, <sup>760</sup><sub>July 7, '94</sub> relates a case of pregnancy following uterine treatment by faradization in a woman, 25 years of age, who suffered from numerous troubles, such as dysmenorrhœa, headache, renal pain, insomnia constipation, etc.,—all reflex symptoms of a functional derangement of the uterus, simulating at times an extreme severity, the material lesions being in reality either slight or entirely absent in such cases. The patient had been under local treatment for nearly a year without experiencing any relief. A series of applications of the bipolar faradic current through the vagina rapidly caused the disappearance of all the symptoms and completely restored her to health. The treatment was immediately followed by pregnancy, which terminated well, leaving the patient in excellent condition.

G. Betton Massey, of Philadelphia, <sup>19</sup><sub>Oct. 28, '94</sub> in a clinical lecture, also cites a case of pregnancy in a patient, cured of a metro-salpingitis, who had had uterine hypertrophy with deep laceration of the cervix and a tumor of the left tube which pushed the uterus to the right and which was very painful. An operation performed for the cervical laceration had left the metro-salpingitis aggravated, rendering the patient a complete invalid. Vaginal applications of the galvanic current were made with the negative pole enveloped in cotton, 50 milliampères being used for several minutes twice a week. Attempts at intra-uterine application had been badly borne. At the time of the lecture the patient was in excellent health and in the fifth month of pregnancy.

This case shows plainly that repair of the cervix or ablation of the ovaries will not remedy a condition due to the bad condition of the uterine cavity itself. It also shows that, though the intra-uterine applications of the galvanic current should be made

with the greatest care in certain conditions, it does not follow that they should be rejected as harmful, or that this fact should constitute an argument against the method.

Apostoli, of Paris, <sup>1061</sup><sub>June 15, '94</sub> presented a very important communication to the Eleventh International Medical Congress at Rome, upon the remote results of conservative electrical treatment in gynæcology. He passes in review in his article the various diseases of women in which this agent, in the form of the galvanic, faradic, or sinusoidal current, has a right to the first place among the curative measures of conservative gynæcology. Endometritis, with its train of symptoms,—amenorrhœa, dysmenorrhœa, menorrhagia, etc.,—is first considered. The positive pole of the continued current conquers hæmorrhage, the negative pole causes the return of the menses, and the interrupted and sinusoidal currents subdue the pain, principally of nervous origin. Galvano-cautery here replaces surgical curetting, on account of its caustic action, reinforced by its dynamic and trophic effects. Without wishing to supplant the curette, electricity is to be regarded as preferable in a number of cases, especially in those in which concomitant lesions of the appendages exist.

The principal rôle of electricity is in the treatment of fibromyoma. It in no way constitutes a radical treatment, although exceptionally tumors may be seen to disappear under its influence. It must remain purely a symptomatic treatment of fibroma, and as such it is capable, more than any surgical intervention, of carrying to the menopause, under the best possible conditions, many women suffering from the affection.

In spite of the opinion of certain interested persons, the author believes that fibroma in itself rarely kills. The same cannot be said of the operation for its relief. For the past twelve years he has observed nearly 2000 patients, and can affirm that uterine fibroma is generally a benign affection, and that a conservative treatment is sufficient in more than 90 per cent. of the cases. Electricity takes the first place among conservative methods, on account of the services it may render; these, from his statistics, may be ranged as follows: Arrest of hæmorrhage, 90 per cent.; disappearance of pain, 70 per cent.; improvement in general condition, 70 per cent.; diminution in the size of the tumor, 10 to 20 per cent.

The lesions of the appendages, which almost always complicate grave endometritis, are also amenable to the effects of the electric current, especially the catarrhal forms; in the grave and especially the suppurating forms, however, electricity is generally powerless.

Gynæcological electrotherapy, therefore, does not make the ambitious claim of being self-sufficient in all cases, and of being able to do without the aid of surgery. The cases refractory to the method may be ranged in three groups: (1) fibrocystic tumors of the uterus; (2) fibroid tumors complicated with serious affections of the appendages; (3) cystic collections (suppurating affections in the pelvis or appendages). In these cases, but only in these, operative intervention is indicated; and even here electricity may aid surgery, elucidating the diagnosis through an attentive study of the operative and post-operative reactions. The fact that it proves useless in a certain doubtful case will serve to point out the proper course, by removing uncertainty, by showing the hopelessness of further conservative measures, and by enabling the surgeon to recommend radical intervention, even though this has already been objected to or refused.

Having given a *résumé* of the services that may be expected from the electrical treatment and its contra-indications in gynæcology, Apostoli touches upon the point of his communication, by giving the clinical picture of the remote results of such treatment, viewed from the stand-point of an ulterior pregnancy. This is of the greatest interest, since it shows, by clinical proofs, that not only may electricity claim to cure symptomatically many women; not only has it the justifiable ambition of avoiding for these women useless and dangerous mutilation, but it proves also that women thus treated by electricity remain in a condition functionally the best for a future pregnancy within a short period afterward. Without claiming that the treatment prepares the way and favors ulterior fertility, it may be affirmed that it in no way prevents such a condition, and that it is not possible to advance against the method the objections urged against certain methods of curetting or the caustic intra-uterine injection of chloride of zinc. The author has collected 80 cases of pregnancy following treatment by electricity, 36 of these being in his own private practice and 44 in his clinic. He gives complete details of these cases, in order that they



may be discussed, analyzed, and proven. The figure is one of considerable size, when it is considered that the majority of the patients were between 35 and 45 years of age, and generally affected with fibroids and the serious troubles engendering sterility. The figure is, besides, not accurate, for a sixth of the patients seen by the author are not included, it being impossible to follow out their history owing to inability to find their addresses.

#### AMENORRHŒA.

Panecki <sup>116</sup><sub>Mar., '94</sub> declares himself a partisan of the faradic current as the most effective weapon against amenorrhœa. It is necessary that the poles be introduced into the uterus, there to exercise their action. The treatment is well supported, the current being gradually increased at each *séance*; the number of *séances*, which should be daily, varies from five to thirty, and their duration from five to fifteen minutes. The experience of the author is based upon eighteen cases, recovery dating back one year in the most recent. One of the patients was a married woman of 31 years, who had never menstruated, although she suffered from periodical disturbances,—violent headaches, etc. She had been treated in many ways for more than six years, without the least improvement. After twenty-eight applications of the faradic current a slight flow occurred. During the following intermenstrual period six further applications were made, and the patient is now entirely cured.

#### DYSMENORRHŒA.

J. H. Kellogg, of Battle Creek, Mich., <sup>855</sup><sub>v. 3, p. 189, '94</sub> recommends, for the cure of the so-called dysmenorrhœa due to obstruction, electrolysis preceded by moderate dilatation and curettage. Dilatation alone, even when sufficient to permit the introduction of the index finger, as recommended by Spencer Wells and others, is altogether insufficient to cure this painful form of the disease. After fifteen years' experience with numerous cases, the author has arrived at the conviction that this dysmenorrhœa is not due to obstruction, as supposed by Peaslee; to neurosis, as recently suggested; nor to antelexion, which is habitually observed in such cases; but to the presence of fungous growths which increase in size at the menstrual epoch and obstruct the canal, although not sufficiently to prevent the flow of blood, or in themselves to render menstruation

painful. Observation of these cases has led the author to adopt the treatment which he recommends, and which offers prompt relief when the ovaries are not diseased. Even in case of ovaries being diseased, the pain changes in character and becomes notably less. The reproduction of the vegetations is prevented by electrolysis, negative or positive, both poles having proven equally efficacious. A moderate current—from 10 to 20 milliampères—is sufficient.

In presenting a nulliparous patient suffering from dysmenorrhœa from the age of puberty, A. Goelet, of New York, <sup>138</sup><sub>Sept., '94</sub> recommended dilatation by means of the negative pole of the galvanic current, with an intensity of 10 to 15 milliampères, followed by vaginal bipolar faradization.

#### SUBINVOLUTION OF THE UTERUS.

Thomas B. Eastman, <sup>56</sup><sub>Aug., '94</sub> in a paper read before the Marion County Medical Society of Indiana, declares himself in favor of electricity in the treatment of this affection, either faradic or galvanic, according to the different periods of the affection. He uses the faradic current (coarse wire) in the hyperæmic stage in order to provoke contractions, which, from being temporary at first, end in being permanent as they increase in frequency. A contraction of the calibre of the blood-vessels then follows, with an acceleration in circulation and resorption, while at the same time the muscles become less flaccid and increase in tonicity. An electrode is placed posteriorly in the *cul-de-sac* of Douglas in such a way as to push forward the uterus, and the other electrode is placed on the pubis. The use of a bipolar electrode vaginally is also followed by good results if placed in such a way as to stimulate the round ligaments. In the period of hyperplasia and sclerosis the galvanic current is indicated, on account of its electrolytic action and the osmotic changes which it brings about in the depth of the tissues. The author places in the uterus a platinum electrode attached to the negative pole, and passes a current of 40 or 50 milliampères for a period of from five to ten minutes, generally until the limit of tolerance is reached. A *séance* every day or every other day, according to the case, is generally sufficient, the entire treatment lasting about four weeks.

The author does not claim to treat subinvolution by electricity

alone, believing that the method is of benefit only when the displacements have first been corrected and laceration of the cervix repaired. It is sometimes necessary to have recourse to curettage.

In the discussion which followed the reading of this paper, Dunning stated that the mode of action of electricity was not yet known, although many theories had been advanced; but while the method of treatment recommended was empirical, it had succeeded in his hands, and he urged its use. Pantzer, Morgan, McNab, and Sterne had also used electricity in the treatment of uterine subinvolution, with favorable results.

Charles G. Cannaday, of Roanoke, <sup>81</sup><sub>Oct., '94</sub> made a communication upon the same subject before the Pan-American Congress at Washington. Besides the ordinary causes of subinvolution, such as abortion, laceration of the cervix, twin pregnancy, exaggerated development of the uterus in simple pregnancy (voluminous fœtus, hydramnios, etc.), the author believes that he has found another cause in the use of ergot during labor. This drug, by exciting the contraction of the smooth muscular fibre, produces a sort of tetanic spasm of the uterus, which later cannot contract sufficiently to lead to involution.

As treatment, besides the usual measures to hasten retraction of the uterus, such as tonics, baths, hot and copious vaginal injections, glycerin tampons, etc., the author asserts that the most efficacious method consists in the use of the faradic current, with the medium Engelmann coil, having a length of two hundred metres and a diameter of seven millimetres, with the bipolar vaginal electrode, after the method of Apostoli. When it is necessary to employ more energetic measures, he uses intra-uterine electricity. It sometimes happens that this treatment is insufficient, either owing to the excessive sensitiveness of the subject or to an advanced degree of organized hyperplasia. The galvanic current should then be tried, the positive pole being placed in the uterus, the intensity of the current being 30 milliampères for from eight to ten minutes, followed, in cases of great pain and tenderness, by vaginal bipolar applications of the faradic current, with an Engelmann coil having a diameter of two and one-fourth millimetres and a length of six hundred metres. When the subinvolution has passed the stage of active congestion, involution may be has-

tened by the intra-uterine application of the negative pole of the galvanic current. By this method recovery takes place in half the time consumed by the ordinary measures.

Laphorn Smith, of Montreal; Sprague, of Detroit; G Betton Massey, of Philadelphia; and Hays, of Chicago, in the discussion of this paper, declared that, according to their own experience, the electrical treatment was really the most efficacious.

#### METRITIS.

G. Betton Massey <sup>144</sup><sub>June, '94</sub> is of the opinion that the majority of the cases of menorrhagia, metritis with or without cervical laceration, displacements, ovaro-salpingitis, etc., are preceded and accompanied by a catarrhal condition of the uterus, which predominates over the trouble of the appendages and persists, to the great discomfort of the patients, after the cervix has been torn apart in one class or sewed up in another, after the pessary has been worn for years or the tubes and ovaries have been removed. The best remedy for the condition is the galvanic current. The cases in which it may be employed are divided by the author into two classes,—those in which the uterus is movable and those in which it is fixed. In the first class, intra-uterine applications of the positive pole, made with circumspection, will give good results in from six weeks to two months. The second class requires that the intra-uterine applications be made with great care, and preceded by a course of vaginal applications of both currents. When there is pus, nothing can be hoped for; but in simple inflammatory conditions of the appendages a good result may be expected.

A. H. Goelet, of New York, <sup>138</sup><sub>Apr., '94</sub> in cases of granular endometritis prefers electrolysis with copper to dilatation followed by curetting, since the latter method requires the use of an anæsthetic and confinement to bed for several days. When the first method is employed the patients can visit the office of the physician and continue their occupations. When the uterine canal is not open he uses a steel dilator, and begins the electrolysis by the negative current for some minutes, followed by the positive pole for ten minutes in a strength of 30 milliampères.

Observations are not wanting of cases of metritis, fungous or otherwise, in which curetting and even castration are at times



insufficient, and in which cure is obtained by galvanic treatment. Larat<sup>720</sup><sub>Dec., '93</sub> reports the cases of two patients suffering from severe hæmorrhagic metritis, one of whom had undergone curetting and the other double castration at the hands of Paris surgeons, with relief for only two or three months. Intra-uterine galvanic treatment led to rapid recovery. One of the patients had a subperitoneal fibroid, which notably diminished in size.

#### SALPINGITIS.

In a communication read before the American Electro-Therapeutic Association, upon the electro-therapeutics of salpingitis, W. B. Sprague, of Detroit,<sup>61</sup><sub>Apr. 7, '94</sub> criticises the poverty of the therapeutic resources of numerous leaders in surgery, who know no other remedy than extirpation,—as though decapitation was the only method of curing migraine! The majority of cases of salpingitis originate in endometritis, but dilatation and curetting of a diseased uterus with inflamed appendages have often aggravated the condition of the patient so much as to render extirpation necessary. It is upon this fact that surgeons base their theory that extirpation should be the first and only resource. Happily, many have more confidence in the processes of nature, and seek to come to her aid, with a view to a possible cure. From his personal experience the author feels warranted in believing that this cure can be effected by less radical and heroic measures, such as intra-uterine galvanic applications. He reports the history of a case cured in this manner, by causing the electrode to penetrate into the diseased tube to a depth of from several centimetres to the five thumbs, in order to render it more permeable and facilitate its evacuation. Pus flowed freely for several days after these applications. The patient was kept under observation for a sufficiently-long period to enable the author to affirm a positive and definite cure. He also cites several analogous cases, in none of which were there any accidents.

In the discussion following, Laphorn Smith; Weber, of Detroit; Massey; Sarah A. Stevenson, of Chicago; and Gehrung spoke in favor of this method, and did not doubt the possibility of inserting a sound into the Fallopian orifice. Massey recalled the communications made by him upon the subject to the Philadelphia Obstetrical Society. He had been able to evacuate a number of

tubes in the same manner. An operation should not be at once undertaken, therefore, in a case of pyosalpinx, but an attempt should first be made to evacuate the abscess naturally by means of the negative pole of the galvanic current. It should be understood, however, that the method should only be undertaken by those who have acquired sufficient experience.

Sanders <sup>27</sup><sub>v. 28, p. 205, '93</sub> declares himself a resolute partisan of electricity in the treatment of oöphoritis, believing that no other method can compare with it; cure is obtained without any risk to the patient, in a period varying from one month to one year, according to the age of the affection. He reports 65 cases treated by him, 40 of whom abandoned the treatment before any positive result could be obtained. Of the 25 remaining, 22 were cured (88 per cent.); of the 3 failures, 1 had submitted to operation before and 1 after the treatment, so that the third was the only case which could be regarded as a true failure.

#### ELECTROPATHY AND TUMOR-DEVELOPMENT.

Rendu <sup>2</sup><sub>May 19, '94</sub> describes the case of a patient, aged 40 years, married for eighteen years and never pregnant. She had menstruated irregularly in girlhood, and the flow had entirely disappeared some fifteen years ago. Zinc and copper plates were applied to the posterior portion of the pelvis. The menstrual flow returned the following month and regularly thereafter for several months. The abdomen then enlarged and a tumor developed on the right side of the uterus, which remained small and mobile. Ascites and emaciation supervened. Rendu operated and found a multilobular cyst of the right ovary, the development of which, he concluded, was determined by the electricity. This deduction, drawn from a single doubtful case, appears to us singularly adventurous, and, in order to be accepted, it must be supported by additional proofs.

#### ELECTRICITY: ITS PLACE IN GYNÆCOLOGY.

J. C. Daily <sup>760</sup><sub>Sept. 1, '94</sub> finds that electricity is indicated in fibroid tumors, uterine hyperplasia, subinvolution, chronic ovarian inflammation, chronic pelvic inflammation with exudate; in all forms of uterine hæmorrhage, certain cases of amenorrhœa, endometritis,

prolapse and deviations due to relaxation of the tissues, dysmenorrhœa, obscure pelvic pain ; in all forms of hystero-neuroses and menstrual disturbance. He has never observed any but good effects from its use, and, compared with the local measures formerly employed, it represents the same degree of progress in gynæcology as the electric cars do over the mule of olden times.

In a recently-published volume, L. Touvenaint, of Paris, <sup>996</sup><sub>Feb. 10, '94</sub> gives the results of his researches for the past two years as to the value of electricity in the diseases of women. He discusses at length the technique, describes the various forms of apparatus and instruments, and devotes the second part of his work to the therapeutics, properly speaking. The period of two years which the author has spent in making his researches seems to us insufficient to warrant his establishing, from personal experience, rules for the use of electricity.

#### PHYSIOLOGICAL EFFECT OF THE FARADIC CURRENT.

Winton, of San Francisco, <sup>77</sup><sub>Aug., '94</sub> has examined the physiological effects of the faradic current in gynæcology, and concludes that the length of the wire should not be a matter of indifference, and that a current suitable for subinvolution would not be suitable for cellulitis. Different lengths and thicknesses of wire give different qualities of current.

#### MYOMATOUS POLYPI.

By means of a modification of the ordinary galvano-cautery loop, introduced by Lebedeff, of St. Petersburg, the removal of myomatous polypi of the body or neck of the uterus, pediculated sarcomata, polypous adenomata, or placental polypi has been rendered more easy ; and, according to Urbain Wiercinski, <sup>48</sup><sub>July, '94</sub> galvano-cautery may replace the operation of "morcellement," or removal of the growth piecemeal, which requires considerable time, is difficult, and accompanied by abundant hæmorrhage,—the more grave as a myomatous patient is always anæmic. It may also replace the "allongement opératoire" of Simon and Hégar, which is nearly always a failure, and also ablation by means of the knot-tie, or twister (*serre-nœud*), which crushes the tissues, and which may give rise to partial inversion of the uterus, and in any case is inferior from an antiseptic standpoint.

## FIBROID TUMORS.

In a conscientious communication read before the Boston Obstetrical Society, upon three years' experience with the electrical treatment of fibroid tumors of the uterus, W. L. Burrage, <sup>99</sup>Mar. 22, '94 describes with clearness, method, and precision, devoid of all enthusiasm, the cases observed by him in the course of his researches, and the results obtained. The number of fibromata treated by him in hospital or private practice was ninety-eight, forty-four of which were treated by Apostoli's method, each patient receiving at least six applications, either intra-uterine or by puncture, with currents reaching 50 milliampères. The patients were observed for a sufficiently-long period (from one and a half to two and a half years) to enable him to formulate definite conclusions as to the permanency of the results. To avoid any confusion only the electrical treatment was employed. Thirty-five cases were analyzed as regards the anatomical results, and all forty-four as regards the symptomatic results. It may be said, briefly, that the former were not satisfactory, the volume of the tumor being in no case permanently diminished, the majority remaining unchanged. A few had increased in size after a period of a year and a half to two years and a half. The author observed no case of rapid disappearance of the tumor. Electricity caused the inflammatory exudate to disappear; it rendered the tumor movable, but did not modify sensibly the size of the uterine cavity. Intra-uterine applications had a temporary curative effect upon endometritis, but the disease re-appeared at the end of some months, as it almost always does after curetting. Cervical stenosis appeared after the use of high currents in a certain number of cases, but never caused dysmenorrhœa.

The symptomatic results were more satisfactory. Pain was relieved permanently in 60 per cent. of the cases, and hæmorrhage in 30 per cent. A permanent improvement in general health took place in 84 per cent. of the cases, work becoming possible. In 23 per cent. the benefit observed was but temporary. There were thus 77 per cent. of symptomatic cures.

The supposed inherent dangers of the treatment are but imaginary, if the application is properly made. The only contra-indications are pregnancy and an acute inflammatory condition. Contrary to the statement of Apostoli, Burrage found that the in-



tolerance of the patient was of no value in diagnosing the presence of pus. As regards punctures, he recommends that these be made by way of the vagina, though he prefers intra-uterine treatment. In cases of hæmorrhage, electricity has the advantage, over curetting and caustic treatment, of not requiring the use of anæsthesia, of having a tonic effect instead of a depressing one, and of producing more durable results.

The author does not think that fibrous tumors are as benign as has been claimed. Although they rarely kill within a short period, they slowly weaken the patients, who lead a life of misery and suffering, because it has been impossible to show them more than one method of relief,—hysterectomy. When the nature of these tumors shall be better understood, with the laws governing their development and the danger to the economy of long compression by them; when the progress of surgery as regards operative technique will have lowered the mortality, hysterectomy will be practiced more frequently and sooner after the development. In cases in which this intervention is not justified (and such cases are not wanting), electricity may be resorted to on account of its harmlessness, its efficacy in pain and hæmorrhages, and its service in improving the general health and strength.

The following are the conclusions of the author: 1. Hysterectomy is contra-indicated in a majority of cases of fibroids, because of the high rate of mortality, and because it unsexes the patient,—an important consideration in young women. 2. Electricity is the best therapeutic means at our disposal to combat pain, hæmorrhage, and impaired health and strength. 3. Intra-uterine galvanism is most useful. 4. We must not look for a permanent reduction in the size of the tumor. 5. Galvanism, vaginal, intra-uterine, or by puncture, does not cause abscesses or adhesions. 6. Galvanism is of no use as a means of diagnosing the presence of pus. 7. Treatment by electricity, after the Apostoli method, is absolutely safe. 8. Every case of fibroid tumor of the uterus should be under competent medical observation, because of the danger of malignant degeneration, kidney disease from pressure, complications during pregnancy, and the liability of the occurrence of pain and hæmorrhage and functional nervous disorders, especially during a delayed and protracted menopause. We note with satisfaction that in the discussions following the reading of

this paper none of the speakers, either surgeons or physicians, showed themselves to be systematically opposed to the electrical treatment.

*Apostoli's Method.*—This was successfully employed by Mme. Kaplan Lapina,<sup>879</sup><sub>Dec., '93</sub> who relates six cases of simple fibromata, hæmorrhagic or complicated. She does not believe that the objection that the method causes cervical stenosis is well founded, since she has observed at Apostoli's clinic a number of former patients, none of whom suffer from dysmenorrhœa.

*Faradization of Uterine Fibromata.*—This method is recommended by Mally, of Paris,<sup>48</sup><sub>Oct., '93</sub> who observed, in the surgical clinic of Terrier at the Hôpital Bichât, thirty-three cases treated by the indirect current, with favorable results as regards pain, hæmorrhage, constipation, and vesical, gastric, and cardiac disturbance. Although the author naturally prefers surgical methods, he cannot do less than recognize the utility of the electrical treatment. However, he limits its utility to the faradic current, and systematically repudiates galvanism, to which he refuses a place in electrotherapy.

“What may be Expected from Electricity in the Treatment of Fibroid Tumors?” is the title of a communication by J. H. Kellogg, read at the third meeting of the American Electro-Therapeutic Association.<sup>61</sup><sub>May, '94</sub> He studies the action of electricity on the symptoms and development of the tumor and the sort of current to be employed. He is convinced that an experienced electro-therapist would not think of employing anything but the continued current, the effects of which cannot be obtained by the faradic or any other current. He also studies the properties of the current utilized in the treatment, the contra-indications of electricity, and the methods of application. Of 62 cases, 82 per cent. were very much improved and 75 per cent. symptomatically cured. In 55 per cent. the tumor diminished in volume and in 14 per cent. it entirely disappeared. These latter were interstitial or submucous, and generally small or of medium size. The author believes that the continued current acts in exactly the same manner as does the menopause, by constriction of the blood-vessels, thus withdrawing the elements of nutrition from the tumor.

Felice la Torre<sup>61</sup><sub>May, '94</sub> endeavors to establish, from our present knowledge of the subject, the true mode of action of electricity

on uterine fibromata. Having recalled and defined the modifications produced in the tissues by each of the poles, the interpolar action, as well as the electrotonic, cataphoretic, and catalytic effects of the galvanic current, the author reviews the various theories advanced for their explanation, especially that of Milne Murray, who attributes to electricity an obliterative action upon the vessels of the capsule of the fibroma; that of Shaw, who regards the coincidence of a diminution in weight and an increase in albuminoid substances as due to a direct electrolytic modification of the tumor-tissue, and more especially of its fluid constituents; that of Willis E. Ford, who also believes in an action upon the fluids of the tumor; that of Ciniselli and Decio, of Milan, to whose theory the author adheres, and from which those of Shaw and Ford are derived. Decio believes that the galvanic current, by a special chemical action upon the tissue of the fibroma, leads to a transformation of the albuminoid substances into peptones, which are then absorbed and eliminated by the kidneys.

#### FAILURE OF ELECTRICITY.

MacMonagle<sup>77</sup><sub>Nov., '93</sub> exhibited, before the San Francisco County Medical Society, a specimen of uterine fibroid which he had removed some hours previously, and which he presented as an instance of the failure of the electrical treatment and of the injurious effects which it might produce. The details of the case furnished by the author are so incomplete that it is impossible for us to form an opinion. This is the more regrettable, as it is exactly the unsuccessful cases which are full of instruction. One of the members taking part in the discussion recognized, in the specimen presented by MacMonagle, not a fibroid, but a sarcoma of a malignant nature. One point struck us particularly, in reading this communication, though it appears to have been overlooked by those taking part in the discussion,—a fact of capital importance, and to which one may look for the cause of failure,—namely, the presence of a pyosalpingitis complicating the tumor. This complication distinctly contra-indicates the use of currents of high intensity, such as appear to have been employed in this case. However that may be, the details being lacking, a definite opinion cannot be expressed.

Haultain, of London,<sup>36</sup><sub>May, '94</sub> gives the statistics of thirty cases

of uterine fibroids and endometritis with subinvolution, not selected by him, but representing cases treated, during the past three years, by means of intra-uterine galvanization. The results were more satisfactory as regards the pain and hæmorrhage than in the reduction of the tumor. Three cases were failures, one of which showed an intolerance of even the feeblest current, and in the other two there was a concomitant cystic affection of the ovaries. In five cases polypi were expelled, after a number of applications, varying from one to twenty-seven. In the cases of subinvolution there was generally a diminution in the size of the uterine cavity and a diminution or total disappearance of the painful symptoms, —leucorrhœa, etc. Three of the patients cured became pregnant after a period of sterility of from six to fifteen years.

At the same meeting Milne Murray<sup>36</sup><sub>May, '94</sub> related a very interesting case of a patient, aged 32 years, suffering from a fibroid the size of a pregnant uterus at six months, with hæmorrhage and symptoms of pressure that rendered the case one of extreme gravity. This tumor had resisted all ordinary treatment. All the symptoms disappeared after the first application of electricity, and the tumor itself disappeared after the fortieth *séance*. This case, although rare, is of a nature to strengthen the confidence of those who have recourse to the method. In what way does electricity act to bring about such a result? It is at present impossible to answer this question; but neither do we know in what manner thyroid extract cures myxœdema, mercury syphilis, and the salicylates rheumatism. Let us be content to obtain the effects,—the explanation will come later.

#### HIGH CURRENTS IN THERAPEUTICS.

From the first time that he used electricity, W. R. D. Blackwood, of Philadelphia,<sup>198</sup><sub>June, '94</sub> has employed high currents, especially in gynæcology. He made use of them in the treatment of fibroids long before the majority of those who now write so much upon the subject. By means of a series of coils from alternating currents and shunts he obtains a current of extremely-high voltage (500,000 to 1,000,000 volts) and also of very feeble strength ( $\frac{1}{2500}$  to  $\frac{1}{1000}$  ampère). The results have been most favorable in tumors, both as regards pain and reduction of volume, and had led the author to the firm conviction that these currents should



be substituted for the galvano-cautery in general practice. These effects are wonderful in dysmenorrhœa, and menorrhagia does not resist a month of such treatment. A small number of cases of amenorrhœa treated by him permits the statement that this symptom is more amenable to continuous currents of a certain intensity.

# HYDROTHERAPY, CLIMATOLOGY, AND BALNEOLOGY.

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## HYDROTHERAPY.

*General Considerations.*—The lack of appreciation of hydrotherapy in the United States is commented on by writers in Germany, where it is regarded in the scientific world as a distinct specialty. The necessity of teaching, in the universities, the properties of water and the technique of its use is urged by Schütze.<sup>1169</sup> Winternitz<sup>1001</sup> confirms the results of the investigations of Rovighi and Thayer as to the effects of hydriatic measures upon the composition of the blood. His assistants ascertained that after all general cold applications, either baths, wet sheets, or douches, there was an increase of red corpuscles in the blood taken from the ball of the thumb or the lobe of the ear. The leucocytes were increased threefold, the hæmoglobin 14 per cent., the maximum effect sometimes being manifested an hour afterward and lasting often for two hours. Active muscular movements produced a similar, though less pronounced effect, especially rendering the effect of the cold procedures more enduring. Warmth had the opposite effect. Winternitz does not regard this result as due to new formation, but to increased activity of the heart and circulation and improved nerve-tone, the red and white cells being thus driven out of the organs in which they are accumulated. Pospischl had already shown that the respiratory interchange of oxygen is increased. Kellogg<sup>855</sup> has obtained results entirely agreeing with those of Winternitz and others. Grawitz<sup>819</sup> also agrees fully with the findings of Winternitz, but explains them differently. That blood becomes more concentrated after cold procedures and less so after warm procedures he believes and has amply demonstrated; this is due to excitation or paralyzation of the vasomotor nerve apparatus, producing contraction of the vessels and preventing transudation of fluids into the tissues or to their dilatation.

Vinaj <sup>1001</sup><sub>Sept., '94</sub> presented to the International Medical Congress the results of his experiments on the effect of hydropathic treatment upon muscle-tone. Cold applications heighten it, while warmth without mechanical irritants diminish it; all applications are enhanced by mechanical aid. Winternitz <sup>1001</sup><sub>Sept., '94</sub> explains the *rationale* of hydropathic procedures in his usual happy and practical manner, concluding that the chief action lies in its affording potent sustenance to the natural powers of the organism against infection. It is, however, as potent for evil as for good.

Baum <sup>1170</sup><sub>No. 19, '93</sub> explains the importance of mechanical irritation in hydrotherapy. Cold rubbing and douches produce a positive effect, as do also wet packs. In the latter the primary cold contracts, while the secondary warmth dilates, the cutaneous vessels. The pack is a calmate, the wet rub more of an excitant. Mechanical irritation is to be preferred in rheumatic affections and in severe neuralgia, and whenever it is desired to powerfully affect the innervation. Baum insists that in the correct dosage of the mechanical irritation depends the successful use of water. Storoscheff <sup>1001</sup><sub>Apr., '94</sub> communicates his results in the application of wet packs (sheets wrung out of water at 60° to 68° F. (15.6° to 20° C.), arms not included, covered by blankets; duration, thirty to forty-five minutes. The rectal temperature at first sank a little, then rose slightly. Blood-pressure increased in the first five minutes, then sank, but remained higher for half an hour; a desire to urinate ensued, 200 cubic centigrammes (6½ ounces) of urine usually being evacuated. The pulse became 12 to 20 beats slower, and remained so. Respiration increased 5 to 10 per minute, very soon reaching normal. Muscular power increased (2 to 18 kilos—4½ to 36¾ pounds); electro-cutaneous sensibility was increased.

Storoscheff <sup>1001</sup><sub>Oct., '93</sub> relates the results of Russian observers with the douche, under a pressure varying from ½ to 1½ atmospheres and a temperature of from 64° to 118° F. (17.5° to 47.5° C.), the duration being one to four minutes. Douches of such feeble pressure can hardly be expected to exert much influence, yet the pulse was usually slowed about 7 to 32 beats and the respiration increased by their use; warm douches produced an opposite effect. The Scotch douche caused immediate lowering of blood-pressure, slowing of pulse, and increase of respiration.

Baruch<sup>2015</sup><sub>1893</sub> believes that the chief aim of hydrotherapy is to stimulate and give tone to the nerve-centres, from which all vital energy emanates. He cites the effect of cold water in syncope as a trite illustration. He claims to prove by his clinical records that the external use of water is a flexible therapeutic agent, adapted to varying types of disease.

Buxbaum<sup>1001</sup><sub>Apr., '94</sub> claims that nearly all cases of sciatica not depending upon organic disease or toxic agencies may be cured by hydrotherapy, and cites several cases. He uses the Scotch douche, a stream of steam of 104° F. (40° C.) played upon the affected limb, followed by a cold fan-douche. These are alternated for five or six minutes and followed by a cold rain-bath. If relief do not follow the first application, the case will probably not yield at all to the remedy. Four cases of enormous obesity are reported by Buxbaum,<sup>1001</sup><sub>Sept., '93</sub> in which hydrotherapy produced remarkable results after failure of other methods of treatment.

Verrier<sup>152</sup><sub>Feb. 9, '94</sub> claims that cerebral, spinal, or cerebro-spinal sclerosis is usually the despair of physicians, and that the only remedy, though not absolutely curative, is water.

In chronic congestion of the liver and in malarial poisoning Dujardin-Beaumetz regards water as an admirable solvent. Great prudence and experience are required. Cold rectal-enemata were recommended by Potain. The effects of the douche-massage treatment as practiced at Aix-les-Bains are well described by Forestier,<sup>211</sup><sub>v. 73, p. 531, '93</sub> and its good effects in chronic rheumatism, neuralgia, gout, etc., thoroughly demonstrated.

Mueller<sup>2026</sup><sub>'93</sub> gives an excellent *résumé* of the hydriatic treatment of neurasthenia, and lays special stress upon the importance of considering the individual case in the application of baths. In no disease is good judgment so much required.

Strasser<sup>1001</sup><sub>Sept., '94</sub> makes a clear exposition of the action of hydriatic measures in malarial fevers, and confirms by his clinical experience the results of Fodor and others. Fischer,<sup>1001</sup><sub>Oct., '93</sub> until recently, doubted the effect of water in intermittent fevers. Experience has, however, convinced him of its efficacy, and he details several cases which yielded to baths of 60° F. (15.6° C.) for two minutes, with friction half an hour before the attack. He ascribes the result to the increase of leucocytes, which, as Winternitz has shown, takes place after cold baths, Kelsch having demonstrated



that there was a diminution of these cells in intermittent fever. [A case of quotidian fever, in a boy of 13 years, which had resisted quinine, arsenic, and change of air for three months, yielded to douches at 60° F. (15.6° C.), the patient standing in warm water, half an hour before the paroxysm, for three minutes. —Ed.]

In a series of articles Winternitz<sup>1001</sup> discusses, with practical minuteness, the theory and practice of hydrotherapy in obstinate stomach troubles. Jumon<sup>108</sup><sub>Sept. 15, '94</sub> speaks of its favorable results in phthisis, its *rationale* being here based upon the increase of red and white corpuscles and upon the invigoration of heart, lungs, and general condition.

Chlorotic individuals are allowed by Rosenbach<sup>57</sup><sub>June 17, '94</sub> to get thoroughly warm in bed, in order to increase the hæmoglobin and red blood-cells; and he then controls the vasomotor neurosis by hydriatic measures, which, however, should be employed with great caution, the baths being of brief duration and only used when the number of corpuscles and amount of hæmoglobin are not diminished. They should be begun in the warm season. A judicious use of hydrotherapy will not only cure the chlorosis, but also prevent relapses, which are frequent in this disease.

Sea-baths are lauded<sup>2022</sup><sub>Mar. 29, '94</sub> in chronic inflammatory conditions of the pelvis, prolapsus, and in uterine fibromata. Comegys<sup>59</sup><sub>Sept. 1, '94</sub> discusses the use of baths in the inflammatory diseases of children, referring to their commendation by H. C. Wood. The child is immersed in water at 75° F. (24° C.), while water at 65° F. (17.4° C.) is poured over the head for eight to ten minutes. Lately he has preferred hot baths of water, two or three degrees above the fever temperature, cold water being poured over the head. Perspiration ensues, and the patient is calmed.

Beni Barde<sup>245</sup><sub>Jan., '94</sub> recalls the fact that Vidal first used temperate douches of light percussion for three to six minutes upon the sides of the vertebral column to combat reflex spinal irritability, to which certain functional (as trophic) skin troubles are due. Several cases of lichen planus, two cases of chronic circumscribed neurodermatitis, lichen simplex, prurigo, and general eczema have thus been cured by douches of 90° to 95° F. (32.2° to 35° C.).

The report for 1893 of the Dispensary for Hydrotherapy of

the Vienna Poliklinik<sup>1001</sup><sub>June, '94</sub> shows striking results in 406 cases of all kinds among the poorest classes; 250 were cured, 153 improved, the result being negative in only 41.

*Hot Baths.*—Baelz, of Tokio,<sup>1001</sup><sub>Mar., '94</sub> claims that the action of hot baths is not so well understood as the cold bath. Sixteen years' experience convinces him of their value as a tonic. In Tokio 300,000 to 400,000 people bathe daily, for about half a cent each. Each person first cleanses himself with hot water, and remains in the hot bath three to ten minutes or longer, producing cutaneous hyperæmia. Afterward another hot ablution is made and again the bath is entered. Even in midwinter these people go out at once into the open air. The temperature of the bath averages 113° F. (45° C.), never under 107° F. (41.7° C.). The temperature of the body rises and the pulse is accelerated. The error that the hot bath is debilitating or increases liability to cold is warmly controverted by Baelz. W. K. Burton<sup>235</sup><sub>Sept., '93</sub> also contributes a paper on the hot baths of Japan. Herzberg<sup>1001</sup><sub>Oct., '93</sub> offers some clinical data to show that the idea that hot-vapor baths are contra-indicated in cardiac troubles is erroneous. Vapor baths and especially hot-air baths are very useful, as they diminish the watery constituents of the tissues, increase and relieve the cardiac action, diminish tension, and drive the blood from the veins to the arteries.

The subsequent cold bath slows the heart and heightens arterial tension. With Rossbach, Herzberg uses hot-air baths in all heart troubles not depending upon arterio-sclerosis. Gilbert<sup>1141</sup><sub>'93</sub> denies that any internal effect follows the use of medicated baths, which he regards as inferior to the natural water. Topp<sup>116</sup><sub>Feb., '94</sub> refers to the contradictory results obtained by Bartels, Naunyn, and Stockvis from hot baths. In experiments upon himself he demonstrated that baths of 115° F. (46° C.) caused great distress, but were followed by comfort, while baths of 108° F. (42.2° C.) were more pleasant. The excretion of nitrogen was somewhat increased. Hot baths are useful in cases requiring active tissue change or perspiration, as in capillary bronchitis, rheumatism, and nephritis; they are contra-indicated in cardiac troubles. Wick<sup>57</sup><sub>Apr. 15, '94</sub> confirms this view, and adds that with increase of temperature the quantity of urine and its solid constituents diminish. Urea is not increased; the nervous system is stimulated; the pulse is not relaxed; leucocytes and hæmoglobin are increased. The treatment

of chronic heart disease by the hot bath and massage, as carried out at Bad Nauheim, is extolled by Thorne. <sup>6</sup><sub>May 5, '94</sub> The bath contains  $\frac{1}{2}$  per cent. of chloride of sodium, and temperature ranges from 85° to 95° F. (29.5° to 35° C.). Resisting movements are made during the progress of the bath. Heitler <sup>169</sup><sub>Apr., '94</sub> confirms the claim of Schott that hot baths act as useful tonics in many cardiac lesions, although there is a general prejudice against them. The physician should be present during the first bath. Achilles Rose <sup>1001</sup><sub>Apr., '94</sub> writes of the use of warm baths in erysipelas and arthritis, their influence upon innervation, circulation, tissue change, absorption, and as an anodyne. He refers to the contributions of Hueter, Reiss, Winternitz, and others proving the value of permanent hot baths in arthritis.

*Hot-Air Baths.*—Telatnik <sup>2028</sup><sub>'93</sub> states that in a healthy man the leucocytes diminish under the influence of hot-air baths, the minimum being 5.45 per cent. and the maximum 7.43 per cent.; the proportion of young leucocytes increases (minimum 4.54 per cent., maximum 15.76 per cent.). This increase is confined exclusively to the small lymphocytes, and is not absolute, but relative to the number of other leucocytes. In this relation the results of researches made by students of Tchoudnowski <sup>2028</sup><sub>'93</sub> upon the action of hot-air baths may be summarized as follows: (1) sudorific action; (2) increase of 1.5° to 2° C. (2.7° to 3.6° F.) in central temperature; (3) increase in frequency of pulse and respiration; (4) diminution of muscular force, vital capacity of lungs, force of inspiration and expiration; (5) increase in assimilation and exchange of nitrogenous matter; (6) diminution of arterial pressure.

Jygatcheff, Morozow, and Jurasov <sup>2028</sup><sub>'93</sub> have studied the effect of hot-air baths in phthisis, and find that the assimilation of nitrogen from the food is increased, while the exchange of nitrogenous matter is diminished, though qualitatively improved; albuminous oxidation is more perfect; muscular force and body-weight are also increased. The assimilation of fatty matter undergoes no change. The authors believe that hot-air baths should rank among the first hygienic measures employed in the early stages of the disease.

*Cold Baths.*—Baruch <sup>199</sup><sub>Dec., '93</sub> argues in favor of the Brand method of treating fever, as against the expectant method, which awaits grave symptoms before acting, and as against the medicinal antipyretic method, the only advantage of which is that it enables the patient to die with a normal temperature. He claims to be the pioneer

of the Brand method in America, and cites the most prominent teachers in the United States as advocates of the method. Page, <sup>59</sup><sub>Apr. 28, '94</sub> in a paper on hygienic *vs.* drug treatment of typhoid fever, says that the reason why the bath treatment—which gives such good results and which has been used by thoughtful members of the profession since the time of Hippocrates—is still ignored so much is because it is not taught in the colleges.

In a discussion on the treatment of pyrexia <sup>59</sup><sub>Aug. 25, '94</sub> before the British Medical Association, Stewart expressed the opinion that no physician could oppose the cold bath, that much depression followed the use of drugs, and that personally he preferred cold or tepid sponging. Not a single advocate of the strict Brand method spoke, except Osler, who expressed his surprise at this fact, and said that the bath had certainly decreased the mortality. It was disagreeable to patients and physicians; but as he had saved many lives by its use, he would continue it, even were it much more inconvenient and troublesome than it is.

Collis Johnson <sup>185</sup><sub>Sept. 15, '93</sub> gives a clinical demonstration of the anti-thermic effect of the cool bath in typhoid fever, pleurisy, and pneumonia. The temperature of the bath should range from 70° to 85° F. (21.1° to 29.5° C.), according to indications. The author concludes that water is of great value, but should not be used exclusively. Hydrotherapy should be better understood and its potency recognized; it should be distinguished sharply from hydropathy.

Thompson <sup>771</sup><sub>Sept. 15, '93</sub> advises cold enemata in typhus fever, which, in his opinion, relieve pyrexia and lessen diarrhœa. Generisch <sup>41</sup><sub>No. 100, '93</sub> affirms that in the dead body of the human adult no fluid can be driven from the œsophagus to the anus; but under moderate pressure water may, with an irrigator secured in the rectum, be driven into the small intestine, stomach, and through the mouth. The large and small intestine and stomach may hold three quarts each. This penetration is also possible in the living subject; after the seventh litre (quart) vomiting begins and water returns from the anus, two or three litres (quarts) remaining. In cholera the author has thus used a normal salt solution, repeating the injection two or three times. This enteroclysis is contra-indicated in heart-lesions, arterio-sclerosis, extensive lung trouble, and also in ulceration of the intestinal canal.



Drasche<sup>1001</sup><sub>May, '94</sub> demonstrates that the hydriatic treatment of typhoid affords incomparably the best results, changing the whole aspect of the case. Baths are to be preferred not too cold at first, but accompanied with friction and moving of the water. Vogl,<sup>1001</sup><sub>May, '94</sub> an authority on cold baths in Munich, summarized his experience in a typhoid epidemic complicated with influenza. When the type of disease was severe and heart-failure was a prominent manifestation, he observed great benefit from baths at 60° F. (15.6° C.), repeated every three hours, when the rectal temperature reached 103° F. (39.5° C.). The mortality was 8.4 per cent. in 426 cases, which was 3.2 per cent. greater than his average in twenty years.

Jackson<sup>1001</sup><sub>Feb., '94</sub> wraps a large towel, well wrung out of ice-water and covered by a dry one, around the thorax in pneumonia. It is changed as often as pain or elevation of temperature requires it, sometimes every five to ten minutes. The face and extremities are bathed with ice-water. He lost only two complicated cases out of twenty-five.

Le Gendre<sup>31</sup><sub>Mar. 17, '94</sub>; <sup>673</sup><sub>May</sub> states that, in the course of all acute diseases of the respiratory passages, and in certain acute stages of chronic diseases of the same region, active hyperæmia is an important factor in determining the aggravation of the local and general condition. In cases where such hyperæmia occurs he has found preferable to all other revulsive measures the permanent wrapping of the thorax in compresses soaked in cold water, wrung out so as to be merely damp, and covered with a thin oil-cloth. These compresses should be renewed every quarter of an hour, then every half-hour or hour, according to the condition of the patient. This is the hydropathic method of German authors, and is of especial value in infantile therapeutics, as it may be used for the youngest child, continued as long as necessary, and resumed whenever there is a return of the congestion. It diminishes dyspnœa more rapidly than any other measure, by slowing and amplifying the respiratory movements and by counteracting the hyperthermia and the nervous disturbances accompanying it, such as excitement, insomnia, and refusal to take food. In the discussion of le Gendre's paper Rendu stated that he had made use of the wet pack since 1884, and had found that it caused a great improvement in grave broncho-pneumonia. He does not use the same method as le Gendre, but leaves his patient in the pack for two or

three hours. In the first half-hour there is a peripheral elevation of temperature, to which succeeds a stage of reaction, with perspiration and considerable diuresis. It is possible that the action is not the same as that obtained by le Gendre, but the effects are excellent and the procedure is perfectly harmless. Richardière has treated sixty cases of broncho-pneumonia after measles, during the present year, at the Trousseau Hospital, and has had excellent results with the wet pack. An important fact is that the temperature does not immediately fall, but that the nervous phenomena are quieted and abundant sweating occurs. Le Gendre has used fresh compresses upon the chest for eight days, in some cases. Rendu considers the compress superior to blisters, in that it causes diaphoresis and diuresis.

Le Gendre<sup>31</sup><sub>Aug. 13, '94</sub> observed the case of a child suffering from albuminuria and other symptoms of nephritis, in the course of a broncho-pneumonia, after the urine had been reduced to 100 grammes (3½ ounces) in twenty-four hours, in which relief followed the use of cold compresses about the thorax. The temperature fell but little, but a diuretic and revulsive action was observed. He also used cool baths in the case. In a paper before the Rouen Medical Society, Didier<sup>203</sup><sub>July, '94</sub> reported cases of grave pneumonia in children treated successfully with cooling applications every two hours for the first two days, followed by baths of 24° C. (75° F.) four times daily for ten minutes. In the discussion Brunon expressed his preference for the bath over wet compresses, because in using the latter the patient was too often disturbed.

Wuart<sup>100</sup><sub>Aug. 4, '94</sub> gives the present status of cold baths in infectious diseases other than typhoid. The history, technique, and physiological action of the Brand bath, which he recommends as proper in infectious diseases, are clearly given. He emphasizes with justice the fact that, so far from being simply antithermic, it acts upon all the functions, is a powerful tonic to the heart and stimulant to the nervous system, disturbances of the digestive respiratory organs yield to it, and it causes the skin to secrete more abundantly and the kidneys to freely eliminate toxins. In erysipelas the bath reduces temperature, renders elimination active, calms agitation and delirium, counteracts myocarditis, and relieves local pain.

Brunon<sup>203</sup><sub>Mar., '94</sub> elucidates clearly the technique of cold baths in

infectious diseases, claiming that the results are sure if begun early.

Leyden <sup>41</sup><sub>Oct. 16, '93</sub> expresses a pessimistic opinion of all medication in locomotor ataxy, and claims that, while baths have no specific effect, they yield good results in relieving symptoms. Now that the peripheral neuritic processes of tabes are receiving more consideration, the cold-water treatment is much resorted to, and the author has found cold compresses often useful for the lancinating pains.

Mouisset <sup>811</sup><sub>Sept. 16, '94</sub> commends baths of 113° to 122° F. (45° to 50° C.) in cases of peripheral neuritis, repeated several times a day as hot as can be borne by the affected parts. Schütze <sup>1001</sup><sub>July, '94</sub> discusses clinically some contrary pulse-curves resulting from hydropathic procedures, and makes the important clinical observation that a large number of neurasthenics do not bear cold applications well, and that care in the selection of cases is important.

Before the Pan-American Congress, Baruch discussed <sup>1001</sup><sub>May, '94</sub> the value of cold baths in acute and chronic asthenia, and showed the absurdity of the fear of cold water. Its popular application in cases of fainting proves its value in this respect. The best remedy in heart-failure, of acute diseases, phthisis, and low forms of neurasthenia is a cold affusion.

Bartels <sup>59</sup><sub>Aug. 26, '94</sub> treats cyanosis and dyspnoea, in advanced cases of croup, by cold affusions. These are given in an empty tub if temperature is over 102° F. (38.9° C.). If it is lower the child is placed in a tub of warm water and cold water poured over him. The good effect is undeniable; respiration is rendered so active that membranes are sometimes expelled. He uses affusions in dyspnoea after tracheotomy, even after the bronchial tubes have become involved.

Oberdoeffler <sup>57</sup><sub>June 17, '94</sub> gives a sketch of Kneipp's method, with a view to appropriating whatever of good there be in it to the uses of medical practice. The method may be explained upon a physiological basis. Reaction being brought about slowly and by the patient's own exertion (walking, etc.), the method is useful in many cases, but injurious in persons of feeble reactive capacity. Another writer <sup>203</sup><sub>Sept. 1, '94</sub> gives a vivid picture of the scenes at Worishofen, and states that Kneipp's treatment consists not only of water, but also of medicinal herbs, with plenty of air, simple food

(chiefly milk and bread), and little meat; very little clothing is worn, and no alcohol or coffee is used.

*Public Baths.*—Gerhard <sup>79</sup><sub>Apr., '94</sub> explains the appropriateness of the modern rain-baths for public bathing. Tubs are entirely abolished; the shower is placed at an angle of forty-five degrees, so as not to strike the head, and warm water is used. The advantages are: the cheapness of construction and of the running expenses, the ease with which they are kept in order, its readiness for use without special cleansing for each bath, the brief time required for thorough cleansing, the small space occupied, the absence of any soiled water, the mechanical and tonic effect of the descending stream, the smaller quantity of water required, the greater privacy, and the absence of danger of contagion. In giving the history of the rain-bath, Gerhard refers to its introduction into the United States by Baruch, who caused the first American rain-bath to be constructed in the New York Juvenile Asylum. This was followed by the People's Bath, the Demilt Dispensary, Baron de Hirsch Fund Bath, and others.

#### CLIMATOLOGY.

The literature of the past few years indicates that climate, *per se*, is not of the first importance in relation to disease, but only a valuable adjunct of feeding, exercise, and cheerful surroundings. Free ventilation, especially in pulmonary diseases, with windows open day and night, has been found to be as important a feature in treatment as systematic feeding. <sup>59</sup><sub>June 16, '94</sub>

It is a noteworthy fact <sup>59</sup><sub>Sept. 8, '94</sub> that climate modifies the principles of applied therapeutics. Some cathartics and narcotics, which in the States east of the Rocky Mountains produce the usual effect, utterly fail to do so on the Pacific coast. The milk diet, which is of such value in other portions of the country, agrees with very few patients in California; the milk will curdle in tough masses and be vomited, or will set up a diarrhoea due to fermentation. All diseases are apt to follow a slower course than in the East, and convalescence is more protracted and less sure. While many maladies are conceded to be of germ origin, C. T. Williams <sup>6</sup><sub>June 2, '94</sub> is of the opinion that climate constitutes the principal condition under which germs develop, multiply, and diffuse themselves; hence climate may be said to be of equal importance with the germs.



Yellow fever and dysentery seem to be more controlled by climate than any other disease, and to require a certain degree of heat for their development. Malaria and malarial fevers, while found in all quarters of the globe, under tropical conditions become much more virulent and enduring. The close connection of the soil with malaria is shown in various ways. Subsoil, especially if it be saturated with moisture, is an essential condition for its development. Altitude exercises some protecting influence, but it has been shown that wind may carry the malarial poison up the sides of mountains and even over their tops. A certain percentage of sunshine is necessary for the proper making of blood, as recent observations show that in rainy districts, like Dartmoor, Eng., the prevalent disease is anæmia.

The habit of many writers of considering temperature and altitude alone, in choosing the best climate for invalids, is entirely at fault; for, if certain temperatures and altitudes are equal, the physiological and pathogenical action is not necessarily the same. Linn<sup>36</sup><sub>Sept. 1, '94</sub> considers the thermic mean, the oscillations of the thermometer, the tension of water-vapor, the relative humidity, the serenity of climate, the sunlight, and the tonic power of radiation and evaporation, all of equal importance in choosing a climate for an invalid.

Cyrus Newton<sup>1030</sup><sub>Jan., '94</sub> warns Americans against the overheating of their houses in winter, and especially against the temperature found in steam-heated hotels and parlor-cars. With a temperature of 80° F. (26.7° C.) and over, as is often found in-doors in winter, and dressed in Arctic clothing, it has been remarked, by foreigners, that it is no wonder Americans have baked complexions, that they shiver and cough when they go out-of-doors, and that they die of pneumonia and consumption.

A scientific paper on "Altitude in Phthisis" is contributed by Jaccoud.<sup>3</sup><sub>Feb. 23, '94</sub> He states that the principal characteristics of climate at high altitudes are: rarefied air, low temperature, from two to three months of snow, purity and dryness of atmosphere; absence of wind, dews, fogs, and clouds, and a high degree of solar radiation. Such a climate as this is adapted at all seasons for the residence of persons suffering with phthisis. Among its general effects may be mentioned increase of appetite and digestion, increase of muscular power, and stimulation of the nervous system. The

special effects are due solely to the rarefied air, and are : (1) increase in the number of red blood-corpuscles ; (2) increase in the quantity of hæmoglobin ; (3) increase in the absorptive power of the blood ; (4) increase in the activity of the processes of nutrition ; (5) permanent increase of chest-expansion ; (6) increase in the activity of the cardio-pulmonary circulation ; (7) diminution of the quantity of blood in the lungs. All of these special effects depend on altitude alone, and have nothing to do with the other elements of the climate.

The late John M. Keating <sup>451</sup><sub>Jan., '94</sub> insisted on the importance of tubercular patients taking up a permanent residence in the climate that is benefiting them, and not expecting that a few months' stay will insure a lasting cure ; also on the inadvisability of sending patients to uncongenial surroundings, no matter how salubrious the climate may be. It is no longer necessary to send patients from America to foreign lands in search of proper climates. We do not yet realize what enormous resources America has in this respect.

The importance of keeping tubercular patients in detached cottages, instead of crowding them together in large hotel-hospitals, is emphasized in an editorial. <sup>9</sup><sub>Mar. 3, '94</sub> There can be no question that many tubercular patients, who have been greatly benefited by a prompt resort to a propitious climate, have subsequently suffered fatal relapse by being exposed to re-infection through dried and uncared-for discharges from other cases.

Although it is generally believed by Eastern physicians that hæmorrhagic cases are unsuitable for climatic treatment, the physicians of the Rocky-Mountain region find that those cases are the very ones in which the prognosis is the most favorable. <sup>1009</sup><sub>Feb., '94</sub> Kimmell, of Finley, O., <sup>199</sup><sub>Nov., '93</sub> having visited many consumptive resorts in America, Europe, Asia, and Africa, has come to the conclusion that Colorado, especially Colorado Springs, is the worst climate he has ever investigated for consumption in any style. He cites several cases in various stages which he claims became rapidly worse after a short residence there, as well as others which proved fatal. He believes that the only patients who return home well from Colorado are those who never had consumption, but merely some functional disease of the throat or thorax. Moore, of Colorado Springs, <sup>199</sup><sub>Jan., '94</sub> states that no case is looked upon or treated as

consumption unless tubercle bacilli are found in the sputum. He has inquired into each individual case cited by Kimmell as being aggravated by the climate of Colorado, and denies most of that author's statements concerning them. Denison,<sup>199</sup><sub>Feb., '94</sub> after a long experience in Denver, Col., finds that most of his conclusions are directly opposed to those of Kimmell's, concerning the benefit received by phthysical patients in Colorado.

In comparing the winter health resorts of Colorado with those of Switzerland, Carl Ruedi<sup>451</sup><sub>Jan., '94</sub> takes only such resorts as have the same fauna and flora, and finds that a difference of two thousand feet in altitude exists where the same vegetation abounds, Colorado resorts being the higher. Valuable tables comparing barometric pressure, humidity, sunshine, temperature, electricity, and velocity of wind of both countries are given.

Colorado, Arizona, and New Mexico have climatic conditions which surpass the best European health resorts. The climate of Denver resembles that of the Lake of Zurich in many respects. Colorado Springs resembles the Valley of the Rhine at Ragatz and Mayenfeld. For a real mountain health resort, nearly equal to Davos and St. Moritz, Ruedi recommends Estes Park, Col., at an elevation of 6940 feet. According to this writer, "Colorado will eventually become the sanatorium of the United States." Stella M. Clarke, of Denver,<sup>1098</sup><sub>May, '94</sub> reports that, according to the oldest physicians of that place, no known case of tuberculosis ever originated in Colorado.

Lindley<sup>44</sup><sub>Apr., '94</sub> recommends Indio, in the centre of the Colorado Desert, as beneficial to rheumatism, phthisis, asthma, and nervous prostration. The season lasts from October to May, and, although the thermometer often registers 116° F. (46.7° C.) in the hottest months, very little inconvenience is experienced, owing to the great dryness of the atmosphere. Aside from its climatic advantages, Indio has good hotel accommodations, excellent water-supply, and satisfactory railway facilities.

C. T. Williams<sup>77</sup><sub>Mar., '94</sub> summarizes the main characteristics of the climate of Colorado as follows: (1) low barometric pressure; (2) atmospheric dryness; (3) clearness of atmosphere and absence of fog; (4) abundant sunshine; (5) marked diathermancy of atmosphere; (6) considerable air-movement; (7) the presence of a large amount of atmospheric electricity.

Moeller<sup>153</sup><sub>May 3, '94</sub> sends to high stations the early cases of tuberculosis, while those more advanced are sent to the warmer southern stations, such as Italy, Algeria, Egypt, or Madeira. He finds that the advanced cases do not bear well the cold of the high northern resorts.

Munn<sup>9</sup><sub>Aug. 18, '94</sub> observes that new countries have always been most lauded as places of residence for those suffering from chronic pulmonary disease. During the last century, first New York, then, later, Ohio, Michigan, Minnesota, North Carolina, and Georgia attained, one by one, a reputation as suitable for tubercular patients, and afterward lost that reputation because they became more populated. This will not likely become true of the Rocky Mountain districts, for that region does not present merely negative conditions, common to all new countries,—*i.e.*, freedom from infection,—but climatic conditions, which prevent the development of tuberculosis and exercise an ameliorating or curative influence upon already existing tubercular lesions.

Karl von Ruck<sup>80</sup><sub>Oct. 18, '93</sub> contends that if elevation is beneficial at all, it must be relatively so, and that it has its limits. He calls attention to the disturbances, both of the heart and respiratory functions, induced in elevated places, especially when the ascent is made quickly, as by railway journeys. He prefers the medium elevation of the Asheville plateau, which is free from all extremes. Out of 518 cases which were examined at Asheville, 35 per cent. were shown to have remained cured two years after discharge, 56 per cent. were improved, and only 9 per cent. grew worse.

Nerve-exhaustion, insomnia, and atonic dyspepsia are the troubles most certain to be benefited by a sojourn at Atlantic City. According to Reed<sup>80</sup><sub>Jan. 15, '94</sub> convalescents from operations, fevers, chronic diseases of women, persistent cases of summer complaint, as well as nearly all forms of malnutrition in children, are benefited by the sea-air of Atlantic City. Other diseases expected to do well there are chronic bronchitis, chronic pleurisy, anæmia, chlorosis, and struma. Chronic malarial cases may also be cured by a long stay there. "There is no doubt whatever as to the entire exemption of the place from malaria in the proper sense of the word,—*i.e.*, the miasm which produces ague and intermittent fever."

Charles Leroux<sup>879</sup><sub>Sept., '94</sub> is opposed to sending children suffering



from pulmonary tuberculosis to the sea-shore. He discusses at some length its advantages and disadvantages in the diseases of children, and sums up as follows: "Send the suitable cases as soon as possible, and be prepared to have them remain at least one year. A continuous sojourn is preferable to several interrupted visits."

Schmidt-Monnard <sup>306</sup><sub>Apr. 19, '94</sub> is convinced of the value of sending poor children into the country for a few weeks in the summer. Some investigations made on the school-children of Halle showed that those sent away corresponded in weight, height, and chest-measurement to the normal measurements of children one year younger. Three weeks' residence, however, in the country improved them so that on their return their measurements corresponded to the normal for their age. This shows that three weeks of country air will do as much to develop these poor children as a whole year in their unhygienic homes.

An exhaustive article by Hudson, and other shorter ones in reply, <sup>6</sup><sub>Oct., Nov., Dec., '93</sub> on "Sea-Voyages for the Surgical Convalescent," treat more particularly of the climate of the ocean itself. The writer does not agree with many that a sailing-vessel is superior for such a voyage. A steamer can sail much better equipped with food, and have more spacious cabin accommodations. Full abstracts from the log of a steamer plying between England and New Zealand, giving the noon temperatures and the force and direction of the wind, are appended.

Weber <sup>6</sup><sub>Oct. 28, '93</sub> describes three cases of injudicious mountain-climbing which terminated fatally, but he recommends systematically-arranged Alpine tours as eminently beneficial if adapted to the capacities of each case. A series of articles on the Island of Madeira <sup>6</sup><sub>Jan. 6, 13, 27, Feb. 10, '94</sub> give a full account and many illustrations of the attractions of that favored spot. The purity of its air, the equability of its climate, the special peculiarities of its site, and the plentiful sunshine, all contribute to make the island pre-eminent as a health resort.

Cheltenham, England, is recommended by Garrett <sup>181</sup><sub>Dec., '93</sub> as having many natural advantages, aside from its numerous mineral springs. Its situation, its views, the opportunities the place offers for recreation and exercise, all combine to make it attractive either for permanent residence or for a shorter sojourn. The death-rate is considerably lower than that of other parts of England.

Bad Bertrich, "the mild Carlsbad on the Moselle," although it enjoys a local reputation as a health resort, according to Greenwood<sup>15</sup><sub>Nov., '93</sub> is little frequented by any but Rhenish Germans and the Dutch. Bertrich is particularly well adapted for treating cardiac cases by the Oertel method of gradually-increased exercise (*vide* ANNUAL, 1894). The beauty of its surroundings and its situation are unsurpassed.

Tangier as a health resort has received considerable attention this year. A series of interesting papers on this nearest of African health resorts, by Ernest Hart,<sup>2</sup><sub>Mar. 17, 31, Apr. 14, '94</sub> give a full account of the climate, which is equable and mild, the mean summer temperature being 74.2° F. (23.4° C.), and that of winter 56° F. (13.3° C.). An account of the customs, diseases, and remedies of the natives is full of interest, and induces the reader to easily believe that Tangier offers, to every one who has a few weeks' holiday at his disposal, one of the most strange and picturesque survivals of old Mohammedan life. It is recommended to invalids and idlers alike. Tangier is also described by Grey<sup>6</sup><sub>June 2, '94</sub> as having all the climatic qualities ascribed to it by Ernest Hart, but that it is rather humid. As yet only a small number of invalids spend the winter there, although a large number of tourists pass through. The climate is well suited for phthisical cases, as well as for bronchitis and asthma. Rheumatism, affections of the heart, and dyspepsia are contra-indicated. The temperate summer climate enables patients to remain there during the entire year, and the phthisical patients who do best there are those who remain for a period of two years. The hotel accommodations of Tangier are praised by Wood.<sup>2</sup><sub>June 13, '94</sub> The prices vary from 8 to 12 shillings per day. The climate, social attractions, and the best routes of getting there are also described by the writer.

The Karoo District, situated in South Africa, is described by de Wit<sup>2</sup><sub>June 19, '94</sub> as having a most excellent climate for certain chest troubles, but not for all. Early consolidation, unilateral pneumonia, phthisis, and cases of hæmorrhage without extensive disease do well in almost every case. Where there is evening fever it is of little use to send the patient there.

A work by Cleasby Taylor, on the "Health Resorts of the Canary Islands in their Climatological and Medical Aspects," is of value to the practitioner who wishes to inform himself of the

climatic advantages of Las Palmas, Santa Cruz, Monte, Teneriffe, and Orotava (*vide* ANNUAL, 1894). Abbazia, in the Istrian Riviera, situated on an arm of the Adriatic, is a comparatively new health resort, and is said <sup>6</sup><sub>Mar. 24, '94</sub> to be well adapted as a delightful place of shelter from wind and cold.

One must not expect to find at Mentone a land of eternal spring. Paul Farina, of that place, <sup>153</sup><sub>Dec. 21, '93</sub> admits that there are some windy days there when the air is quite sharp; that rain does fall; that snow and ice are sometimes seen there. He deprecates in general the practice of sending patients to any resort without giving them a true idea of what is to be expected in the way of climate. This mistake generally arises from ignorance on the part of the physician, or from personal deductions drawn from a very short visit. The climate of Algeria is described by Sharp <sup>6</sup><sub>Feb. 17, '94</sub> as superior to that of Italy or the Riviera, but, as the accommodations are as important to most invalids as the climate, he does not advise one to spend a long time there, except perhaps at Algiers or Biskra. The invalid should not remain long on the sea-coast, but should go southward toward the desert, where the resorts are better prepared for visitors. Biskra is a village of about 7000 inhabitants, and dates from the Roman period. Mivart <sup>2</sup><sub>Jan. 26, '94</sub> finds that Alassio, in the Riviera, is so hemmed in by hills as to render it airless, and that it is also filthy. He is more pleasantly impressed with Rapello, which he considers one of the loveliest spots on the Riviera del Ponento. After a winter residence of several years Rathbone <sup>2</sup><sub>Feb. 10, '94</sub> totally disagrees with Mivart as to the healthfulness of Alassio. His experience convinces him that it is the most invigorating and recuperative climate on the Riviera, especially for those run down by excessive brain-work.

A favorite resort of the residents of Cairo is Helonan-des-Bains. It is situated in the desert, fourteen miles southeast of Cairo. Hinsley Walker <sup>6</sup><sub>Oct. 7, '93</sub> describes it as a place where a patient may, with safety, partake of his *déjeuner* in midwinter in the open air soon after his bath. It is secure from any danger of malaria, which invests so many of the health resorts of Egypt situated within reach of the annual inundation of the Nile. The purity and dryness of the air and its tonic effects are only comparable to that of the Alps. There is often a difference of 20° F. (11.1 C.) between the temperature of noon and midnight; but if proper pre-

cautions be taken, patients find the cold nights invigorating. Every luxury is available, "and to the rheumatic, the gouty, the debilitated, and the nervous and irritable this health resort is truly an oasis in the desert."

## BALNEOLOGY.

The employment of mineral waters in childhood is discussed by Vivien.<sup>211</sup>  
Oct. 8, 15, '93 He has gone into the subject quite comprehensively, and his observations are of considerable value. The various springs of each class are mentioned, and their especial adaptability for the diseases of childhood pointed out. The article is complete as far as French sources are concerned, but it is limited, unfortunately, to the waters of that country. France seems to be very fortunate in its supply of medicinal waters, for she has all varieties in abundance except a good purgative water.

A satisfactory review of the history, topography, and various features of Baden-Baden as a resort, as well as a comprehensive description of the springs, their physiological actions in disease, and the various affections for which their waters are recommended, has been published by W. H. Gilbert, of Baden-Baden.<sup>2027</sup>  
'93 Frey<sup>116</sup>  
May, '94 also contributes a valuable article on this resort.

A very interesting description of the alkaline-arsenical iron-waters of Bagnères-de-Bigorre is given by J. M. Cynos.<sup>153</sup>  
July 6, '94 The springs, three in number, are situated in the valley of the Pyrenees, 1700 feet above the sea, in a remarkably charming spot. One spring is warm and contains 2.50 grammes ( $38\frac{3}{4}$  grains) of  $\text{CaSO}_4$  to the litre (quart). It is used externally only. The other two are cold, one containing iron and the other  $\text{NaSO}_4$ . Nervous affections, rheumatic diseases, and tuberculosis are all benefited by a course here. The waters containing  $\text{NaSO}_4$  are preferred in acute rheumatic troubles, while the lime-waters are employed in chronic forms. Great claims are also made for the good effects produced by the use of the waters in tuberculosis; and this station is cited as one of the best for this class of diseases. According to de la Garde<sup>996</sup>  
Sept. 10, '94 the arsenic in these waters is the active agent in the cure of nervous diseases, while the sulphur is the active agent in rheumatic affections.

Bad Brückenau is spoken of in high terms by Wehner.<sup>34</sup>  
July 17, '94 In 1893 20 per cent. of the patients treated there were suffering from such troubles, one-third



of this class seen by Wehner being afflicted with chronic nephritis. Many patients in whom the nephritis originated during a pregnancy or puerperium, or in some acute infectious disease, recovered. Many alcoholics, also, with an interstitial nephritis were greatly helped by a course of treatment here. Anasarca was almost always relieved, and even cases of pyelitis and chronic cystitis were benefited. Treatment, aside from the water, consisted in milk, fresh air, and rest.

Laranja<sup>188</sup><sub>May 20, '94</sub> reports a case of contraction of the palmar fascia, probably of rheumatic origin, greatly relieved by treatment at Dax. The case was of three years' standing, in a man 57 years of age. The treatment, which lasted thirty days, was as follows: In the morning superheated mud was applied to the affected hand for twenty minutes, followed by douching of the hand with water at a temperature of 38° to 40° C. (100.5° to 104° F.); in the afternoon a local vapor-bath, followed by a douching as above.

Some extracts from a letter written by Kocher, of Berne,<sup>214</sup><sub>Oct. 15, '93</sub> give much important information from personal experience as to the value of Carlsbad water in the treatment of gall-stones. He has tried both Vichy and Carlsbad, and finds quicker and more lasting relief at the latter resort. Vichy he prefers for gastric affections, Carlsbad for liver troubles. He claims that one course at Carlsbad cured him completely. The salt dissolved in water is not equal to the water taken at the spring. In 1884 Jaworski made some experiments to determine the action of Carlsbad water on the gastric functions. Four years later Ewald and Sandberg, not satisfied with his conclusions, made similar experiments, but with quite different results. Now Spitzer<sup>116</sup><sub>Apr., '94</sub> makes a third series of experiments and finds that his conclusions agree with those of Ewald and Sandberg. He finds: 1. Carlsbad water, in the majority of cases, increases the peristaltic action of the stomach, and never diminishes it. 2. It never diminishes the quantity of pepsin. In a few cases of slight gastric catarrh, the quantity of pepsin was even increased. 3. The secretion of HCl varies in amount, but always within physiological limits.

An article by Dujardin-Beaumetz<sup>67</sup><sub>July 15, '94</sub> is devoted to "Vichy and its Waters." The future of the place rather than the therapeutic quality of its waters is referred to, and an attempt is made to ascertain why Carlsbad is growing, apparently at the expense

of Vichy; for Carlsbad is as yet the only rival of Vichy. He concludes that at Vichy not enough enterprise is manifested in catering to the increasing demands of the public. The first-class baths are lacking not only in many little things which make one comfortable, but the buildings themselves are illy adapted to the purpose. The sewers and water-supply are not sufficient even for the present population; and not until Vichy puts up new buildings with all the most modern appliances will it regain the reputation it had during the time of Napoleon III.

The Cordo Spring in Harzburg is held in high esteem by V. Stein. <sup>4</sup><sub>Mar. 5, '94</sub> It contains, at a temperature of 9.2° C. (49° F.), 0.576 gramme ( $8\frac{7}{8}$  grains) of Glauber's salt and 14.9 grammes ( $3\frac{3}{4}$  drachms) of chloride of sodium to the litre. [The Homburg contains only 9.86 grammes ( $2\frac{1}{2}$  drachms) of chloride of sodium, Wiesbaden 6.82 grammes ( $1\frac{3}{4}$  drachms), and Kissingen 5.82 grammes ( $1\frac{1}{4}$  drachms) to the litre.] The dose is naturally much smaller than any of these waters. It has been found most useful in chronic constipation, chronic gastric and enteric catarrhs, congestion of the liver, and cholelithiasis.

Previous to 1870 Niederbronn, in Alsace, <sup>4</sup><sub>May 28, '94</sub> was a French resort. Now, however, it is German and ranks with Homburg, Kissingen, and Wiesbaden. France has no chloride-of-sodium spring left which can compare with it; and yet, since the Franco-Prussian war, the French have deserted it, while the Germans have not visited it to the extent that it deserves. It is situated in a valley at an altitude of 600 feet, in a most charming part of the Vosges Mountains, surrounded by woods and hills. The mean summer temperature of the place is 16.7° C. (62° F.). The Haupt-Trinkquelle is the one mostly used, and it furnishes 225 litres of perfectly-clear water a minute, at a temperature of 18° C. (64° F.), containing chloride of sodium as the main ingredient. According to Biedert it has about the same quantity of chloride of sodium as the Ludwig and Luise Springs at Homburg, and only half-as much as the strongest springs at Kissingen and Wiesbaden. It surpasses Kissingen, however, in iron, and Wiesbaden in the chlorides of magnesium and calcium. It is advised for chronic diseases of the stomach and bowels, for diseases of the liver and gall-ducts, for constipation and the consequent nervous disturbances, for anæmia and diseases of women.

The bathing resorts of Silesia are described by Leonhardi.<sup>123</sup>  
 Hermansbad von Muskau, the most northerly, is situated in a valley only 300 feet above the level of the sea. There are two springs here, both ferruginous; one is used internally, the other externally. The baths themselves are very comfortably arranged, and the surrounding country is most charming. The other springs are farther south and at a higher altitude, none being less than 1000 feet above the sea. Two of these have been known for more than a century. Warmbrunn and Landeck are both warm, and were formerly classed among the sulphur-waters, but now are grouped under the indifferent waters. Warmbrunn has a temperature varying from 34° to 42° C. (93° to 107.5° F.), and is most valued in cases of rheumatism or gout, neuralgia, paralysis, and skin diseases. Landeck is somewhat cooler, varying from 23° to 28.6° C. (73.5° to 83.5° F.). It is especially adapted for those suffering from neurasthenia, anæmia, or catarrhs of various organs. Two valuable brine-baths are also found here,—Goczalkowicz and Königsdorff-Jastrczemb. The best-known sparkling water is undoubtedly Obersalzbrunn. It is situated at an elevation of 1200 feet above the sea, and, with a temperature of 6° to 7.5° C. (43° to 46° F.), contains 2.15 grammes (33 grains) to the litre of bicarbonate of soda, which is more than the Ems water contains. It is employed in all diseases of the respiratory tract, in gastro-enteric catarrh, and in all affections of the liver. There are six other springs worthy of mention, all containing iron,—Flinsberg, Charlottenbrunn, Reinerz, Alt-Harde, Cudowa, and Niederlangenau. They are visited mostly by those suffering from anæmia due to various affections.

Considerable literature has appeared this year on the medicinal waters of the Pyrenees. Garrigou<sup>31</sup>  
 July 18-23, '94 gives a very comprehensive classified list of all the principal springs, while le Clerc<sup>203</sup>  
 May 1, June 1, 15, '94 considers the indications and contra-indications for their use.

The action of the water from the Lucius Spring at Tarasp has been accurately studied by Leva, of Tarasp-Schuls.<sup>4</sup>  
 Mar. 12, 19, '94 He experimented on himself, weighing and measuring carefully all that he ate and drank. His urine and fæces were also collected and examined. His conclusions are as follow: 1. The quantity of urine passed is increased. 2. The movements from the bowels are thinner, more copious, and contain more nitrogen than normal.

3. The amount of nitrogen excreted is greatly increased if large doses are taken, while small doses require some time to produce any noticeable increase. This increased excretion continues for some time after the ingestion of the water is stopped. 4. The appetite is much improved. The increased excretion of nitrogen must be due not only to the chloride of sodium, but also to the sulphate of magnesium which is found in the water.

There are two springs at Ydes, the Saint-Georges and Saint-Martin. Both are cold— $11^{\circ}$  to  $12^{\circ}$  C. ( $52^{\circ}$  to  $54^{\circ}$  F.)—and contain the chloride and sulphate of soda. Small doses, according to Béal,<sup>996</sup><sub>Mar. 10, '94</sub> stimulate both appetite and digestion. Larger doses are purgative and diuretic. Chronic constipation, gastric catarrh, obesity, and biliary lithiasis are proper cases to send to Ydes.

The Rudolfs Spring at Zlatten, in Steiermark, is fully described<sup>837</sup><sub>Dec. 10, '93</sub> by Donath, of Brünn. It is an old spring, having been described as far back as 1777. The temperature of the water is  $5.4^{\circ}$  C. ( $42^{\circ}$  F.). It is not quite clear when first drawn, but it soon becomes so with the deposition of a fine, flocculent sediment. It is odorless, slightly acid in taste, with the faintest after-taste of salt. A complete analysis is given, which puts it in the same class as the waters of Ems, Giesshübl, and Neuenahr.

For cases of anæmia, enlarged lymphatic glands, chlorosis, localized tuberculosis, and all disorders of nutrition, the springs at Mouillère-Besançon have been advised.<sup>153</sup><sub>June 14, '94</sub> These waters contain 292 grammes ( $9\frac{1}{2}$  ounces) of alkaline chlorides and 0.108 gramme ( $1\frac{3}{4}$  grains) of bromide of potash to the litre. Experiments made at the spring, to determine the influence of these saline baths on nutrition in disease, have borne out the conclusions of Robin made in the laboratory.

Of the springs devoted to the treatment of tuberculosis, none seem to surpass that at Mont Doré, situated at an elevation of 3000 feet. J. Mascarel<sup>164</sup><sub>Apr. 19, '94</sub> relates the history of a few cases cured at this resort. He sums up his conclusions as follows: 1. Mont Doré and its waters exercise a most favorable action on all forms of pulmonary tuberculosis. 2. This action is the more favorable the earlier the case comes under treatment, and is more favorable in acquired than in inherited forms. 3. A good result may be expected in all cases, provided a portion of the lung sufficient for proper hæmatosis remains.



Eaux-Bonnes is another station devoted to the treatment of respiratory diseases, and is situated at an elevation of 2200 feet. According to Cazaux <sup>24</sup><sub>July 8, '94</sub> the waters have a temperature of 32° C. (90° F.), and are classed among the sulphuretted lime and soda waters.

A paper by Ferras <sup>188</sup><sub>July 16, 22, '94</sub> gives a very good idea of the various sulphur-baths and their uses. A list of the different sulphur-waters is given, and the special class of cases most adapted for treatment at each. The discussion on the paper <sup>168</sup><sub>May 27, '94</sub> was devoted mainly to the treatment of syphilis by these waters.

The Cestilia Spring at Torre Annunziata, in Italy, is fully described by Fasana, <sup>1097</sup><sub>June 30, '94</sub> in a paper read before the International Medical Congress. The water has a temperature of 30° C. (86° F.), and is classed among the alkaline ferruginous waters. Complete analyses are to be found in the article, as well as some results obtained in the treatment of patients. Rheumatic, gastric, and skin affections seem to be the prevailing diseases treated here.

Pennsylvania does not include within its borders medical springs of any especial note. <sup>79</sup><sub>July, '94</sub> It possesses, to be sure, some springs that have been analyzed, but these analyses show the waters to be of little medicinal value, with two exceptions. The Cresson Springs water is a chalybeate water having 23.5 grains (1.5 grammes) of sulphate of iron to the gallon (4 litres), and the water of the Kane Geyser well contains 6455 grains (416.45 grammes) of chloride of sodium and 2871 grains (185.22 grammes) of chloride of calcium to the gallon. Virginia, on the contrary, <sup>79</sup><sub>Oct., '93</sub> contains mineral springs of almost every variety, and some, notably the White Sulphur, are of world-wide repute. A. N. Bell devotes considerable space to an enumeration and analysis of the various springs which have been brought to the attention of the profession.

## HYGIENE AND EPIDEMIOLOGY.

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### HYGIENE.

THE principal events in the sanitary world during the past year have been the meetings of the International Sanitary Conference at Paris, France, in February, 1894; the Eighth International Congress of Hygiene and Demography at Budapest, Hungary, in September, 1894; and the American Public Health Association at Montreal, Canada, during the same month. Each of these meetings proved to be of signal importance in their respective fields of work. The Paris conference held sessions from February 7th to April 3d, and considered the following proposals: I. Prophylaxis of the Pilgrimage to Mecca. II. Protection of the Persian Gulf. The first question included the consideration of sanitary supervision of the pilgrimage by way of the Red Sea, sanitary police at ports of departure, improvements to be instituted at the quarantine stations of Cameran, Abou-Saad, Abou-Ali, and Vasta, and the reorganization of the station at Djebel-el-Tor. The second question dealt with the establishment of sanitary posts along the littoral of the Persian Gulf, for sanitary supervision of vessels plying between Bengal and Persian-Gulf ports, and of the pearl-fisheries, the contraband horse-trade, and the transfer of bodies arriving by caravan for transportation to Kerbela for burial; also the establishment of a large and permanent lazaretto at Fao for the protection of the mouth of the Chatel-Arab against importation of cholera from Turkey or India, with a smaller lazaretto on one of the two Ottoman islands of Salahiyé and Yilaniyé, to supplement the operation of the lazaretto at Fao. The most difficult task of the conference was to arrange the

details of international control of maritime quarantine in the Red Sea and the Persian Gulf. The conference was, to a certain extent, diplomatic, and the delegates were authorized, within certain limits, to act for their respective governments. It was agreed to intrust the administration of maritime quarantine to a committee composed of three representatives of the Ottoman government and of the several powers who had previously accepted the sanitary agreement of the conferences of Venice and Dresden. The expense of carrying out the proposed system of quarantine should be divided between the Ottoman government and the Sanitary Council of Constantinople, according to a rate already fixed by the contracting powers. Taxes and sanitary fines were adjusted, and a consular commission, residing at Constantinople, formed which should have cognizance of all disputed cases. The text of the agreement drawn up by the conference was signed, with reservations, by nearly all the delegates present. The delegates of the United States—Stephen Smith, of New York; E. O. Shakespeare, of Philadelphia; and Preston H. Bailhache, of the Marine-Hospital Service—claimed that the United States should not be excluded, by the fact of not having been represented at the preceding conferences of Venice and Dresden, from representation in the international committee organized for the protection of the health of Europe and America. They stated that immigration from Europe to America placed United States ports in direct relation, by way of European immigrant ports, with danger-points in the East. In conclusion it may be stated that the system proposed by the conference for the disinfection and sanitation of persons and vessels during the voyage and at the ports of departure and arrival, was based on the application of the most modern principles and appliances.

The meeting of the International Congress of Hygiene and Demography, which was opened on September 2, 1894, will be noted for first giving publicity to the diphtheria cure by antitoxin serum, by Roux, of the Pasteur Institute in Paris. (See article on "Diphtheria," vol. i, section I.) Many other important papers were presented by distinguished sanitarians from various parts of the world. Charles Finlay, of Havana, in a paper on "Yellow-Fever Infection," expressed the opinion that partial or total immunity from yellow fever probably results from even the mildest

yellow-fever infection. A succession of mild attacks appears not infrequently to endow the person thus affected with total immunity. The adult natives of Havana probably owe their immunity to the effect of slight attacks of yellow fever in childhood. Finlay alludes to the theory which attributes the spread of yellow fever to mosquito-bites, and states that, in the course of thirteen years, ninety persons were shown to have been inoculated with yellow fever by mosquitoes. Care should be taken to prevent mosquitoes from settling on yellow-fever patients.

In a paper on the "Bacteriology of Cholera," Max Gruber, of Vienna, <sup>6</sup><sub>v.2, pp.3,68, '04</sub> supports the bacteriological theory of cholera, but is of opinion that wider investigations are necessary to prove the truth of the propositions advanced by Koch. The vibrio can be divided into many subspecies difficult to distinguish from one another. Some of the characteristics of the vibrio are of no practical value so far as the diagnosis of cholera is concerned; in the majority of cases of cholera, however, the characteristics are quite definite. The identification of vibrios found in water with cholera vibrios must be regarded with suspicion. Gruber considered the microscopical appearances of the young colonies of Koch's vibrio in 10-per-cent. gelatin to be entirely characteristic. Metschnikoff, in the discussion, expressed an opposite opinion and gave an account of experiments showing the interaction between the vibrio of cholera and other microbes. Clemow, of Cronstadt, adduced the recent case of cholera on board the *Baltimore* as evidence of the theory of the water-carriage of cholera, but asserted that local conditions are also potent factors in the spread of the disease.

#### ENVIRONMENT OF MAN.

*Hygiene of Pursuits.*—It is a matter of common observation that every new industry creates new dangers to health and should receive attention from the hygienist. At a meeting of the Academy of Medicine of Paris, Lancereaux <sup>6</sup><sub>Dec.20, '98</sub> exhibited the lungs of a polisher of carbon terminals for the electric arc light, the organ being transformed into veritable blocks of carbon and large vomicæ being also visible. The deceased had been working for six years in a workshop, eight metres long by seven broad, where with eight other men he was engaged in polishing, on stone mills, charcoal for electric lights.



On the subject of lead poisoning in the industries the government of Great Britain has instituted an investigation, through the office of the Home Secretary.<sup>2</sup><sub>Dec. 23, '93</sub> The Departmental Committee thus formed was a thoroughly-representative one, and took up their task with a view to systematic study of the use of lead in the mechanical arts and its effect upon operatives. The report of the committee has been made public, and among the more important recommendations made by them is that female labor be prohibited in all the processes where there is direct contact with white lead; for example, stripping the stacks and emptying the stoves; that in other parts of the factory, where there is no white-lead dust, no female under 20 years of age shall be employed, and that previous to her employment she shall be certified to by the medical attendant to the works; also that if a female have been off work through illness, on her return a medical certificate as to her health and general fitness must be presented. In other words, men are to supplant women in the more dangerous processes of white-lead making. This recommendation is not made upon medical evidence alone. Two years have been allowed by the committee before this prohibition is to be made operative.

A serious strike recently threatened to break out in the match-factories near Paris, the workmen refusing to submit to a sanitary inspection of the mouth ordered by the managers of the factories.<sup>996</sup><sub>Aug. 25, '94</sub> The object of the inspection was to determine the presence of a disease known as phosphoric necrosis of the jaw, to which workers in match-factories are liable. The first effect of phosphorism is a species of progressive saturation and slow poisoning. Into this condition a very short stay in a match-factory invariably brings the operatives, and, this condition once declared, the slightest injury to the mouth may determine a serious or fatal state of necrosis. Any workman who is attacked or only threatened with this disease should be removed from the factory and treated surgically and medically.

*Practical Disinfection of Railway-Cars.*—Petri<sup>1</sup><sub>June 9, '94</sub> and others inoculated 117 guinea-pigs with car-dust. After from four to six weeks all of these animals then living were killed and examined for tuberculosis. Three well-marked cases of the disease were found in animals inoculated with the dust of sleeping-cars. Of the 114 remaining, 45 died of infectious diseases, as follows: 27

from peritonitis, 14 from malignant œdema, 2 from abscess of the liver, 1 from abscess of the abdominal wall, and 1 from tetanus. Floors of cars were examined 383 times, and 42.6 per cent. of these were found to have sputa present in notable amount. For disinfecting cushioned, carpeted, and otherwise-upholstered cars steaming is the only absolutely-reliable method.

#### LIGHT.

*Solar Rays as a Disinfectant.*—The objection which applies to all the disinfectants now in use—that they damage articles exposed to them—suggests that some practical application might be made of the disinfecting properties of light. <sup>June 9, '04</sup> Duclaux, Arloing, Patella, and others have demonstrated the bactericidal power of the sun's rays in the case of various microbes; and Koch has shown that the tubercle bacilli can withstand the solar rays for only a short time. Nuttall's assertion that its effect is confined to the upper layers of substance seems contradicted by the results of some recent experiments of Boubnoff, which prove that the chemical rays of the sun entirely penetrate a fabric of ordinary thickness. Pillows and skins impregnated with microbes out of pure cultures or with pus containing microbes were exposed to the sunlight and sample cultivations made before and after exposure. The results of these experiments show that the sun's rays have a disinfecting action on the upper layers of stuff, but in no case, except that of the diphtheritic bacillus, was the action extended to the deeper layers. In the case of dark objects the effect was quite superficial. Cholera bacilli were destroyed in the deeper layers of stuff, but this result must be attributed to the drying process. Esmarch concludes that mere sunlight affords, in our latitudes, only an unsatisfactory and inadequate means of disinfecting infected objects, with the probable exception of cholera bacilli, as above indicated. Other observers are not disposed to accept these results.

Karlinski, an expert bacteriologist, accompanied a band of pilgrims, and made a number of interesting observations in connection with the examination of cholera dejecta. The comma bacillus was at times very difficult of recognition, and was, in a few cases, present without causing cholera symptoms. While at El Tor he made a few experiments, and reached the conclusion

that the sun exerted an important influence as a disinfectant, and that not merely because of its warmth and drying power.

*Purification of Water by Solar Rays.*—Buchner <sup>126</sup><sub>Aug., '94</sub> reports the results of some experimental studies in the effect of light in purifying running water. He found that direct solar light kills, in one or two hours, the ordinary culture bacillus, the typhoid, choleraform, held in suspension in the water. Even diffused daylight notably diminishes the number of bacilli in the course of two hours. The micro-organisms named, when placed on culture-gelatin and exposed for one and a half hours to direct light and five hours to diffused light, lost the property of reproduction. From experiments made on Lake Sternberg Buchner concludes that in tolerably-clear water the microbicidal power of light is felt at a depth of about two metres. In running water the effect is shown in periodical variations in the germ-contents, a minimum of microbes being found in the evening and early night hours, a maximum in the morning and early part of the day. The arc electric light kills germs suspended on agar plates. Buchner states that typhoid bacilli develop best in the orange rays of the spectrum, or deep red and violet, while they cease to develop in the green, blue, and pale-violet rays.

*Artificial Light.*—A system of artificial lighting in which metal or opaque glass reflectors are placed behind the gas-jets, has been adopted <sup>126</sup><sub>July 15, '94</sub> at the Institute of Hygiene at Halle. With glass reflectors the light is more uniformly diffused from a height. With metallic reflectors the lights should be placed low. The increase of light obtained from gas-jets indicates a more complete combustion of the air in the apartment. Lewis states that the sulphurous products released by the combustion of tolerably-pure gas have not the deleterious effects attributed to them. The sulphates frequently found in the dust of gas-lighted rooms he attributes to outside atmospheric impurities. The possible injury to health from gas lighting is due solely to carbonic acid and to traces of organic matter inhaled by the lungs.

Auer's incandescent burner consumes less gas and vitiates the atmosphere less than the ordinary burner or than the Argand burner. It produces less carbonic acid by one-half, throws out much less heat, and charges the atmosphere with only a very inconsiderable amount of the products of combustion.

## WATER.

The ultimate object, in examination of water-supply for potable purposes, is not only to determine the presence or absence of the zymotic bacteria and whether the water is fit to drink at the present time, but as to whether it may be of such a character as to become dangerous to the public health in the future. S. E. Jelliffe, in a preliminary report on the Brooklyn, N. Y., water-supply, <sup>157</sup><sub>Oct., '93</sub> says: "A perfectly-pure water is free from all organisms; but, given a number of organized vegetable and animal forms which may break down by mechanical or other means, there is provided immediately a more or less rich albuminous pabulum which will assist in the growth of both pathogenic and non-pathogenic organisms." This very evident proposition should always be borne in mind by analysts, who are more than ever relying on bacteriological methods of examination of water-supplies.

*Disease-Germs in Ice.*—Investigations made in the Imperial Health Bureau at Berlin <sup>22</sup><sub>June 9, '94</sub> show that the ice used in Berlin contains pathogenic germs which are capable of development and of originating disease. It is probable that the cases of illness frequently observed after the partaking of iced drinks are due not to the coldness of the drink, but to disease-germs imparted to it by the ice. Butter and other solid articles cooled on ice are liable to contamination.

*Contamination of Well-Water.*—The contamination of well-water by leakage can be detected by the addition of saprol <sup>1</sup><sub>June 9, '94</sub> to the suspected source of contamination,—manure-heap, vault, etc. The ordinary commercial article, containing 40 per cent. of cresol, should be used. If contaminated from the source suspected the water will soon betray the presence of this coal-tar product. One part of saprol may be recognized by the sense of smell in a million parts of water.

*Water-Sampling Apparatus.*—G. M. Cheeseman exhibited, before the Pathological Society of New York, <sup>50</sup><sub>Sept. 8, '94</sub> an apparatus for collecting samples of water at different depths. He described it as an adaptation of a device believed to have originated with Pasteur. The apparatus exhibited was suggested by Prudden and elaborated by several others. It consists of a metal tube of small calibre and about one metre in length, divided into equal



parts. To the lower end of this tube are soldered two rings for supporting two vacuum-bulbs. Beneath these two rings are two broken rings arranged to slide on the end of the tube. They are held in place by a rubber band or strap. In collecting samples the capillary ends of the bulbs are broken off when they have been immersed respectively at the levels from which it is desired to take samples. The breaking of these ends is accomplished by means of small copper wires attached to their bent ends. Breaking is facilitated by making a cut in the glass, with a file or diamond, at the desired point.

*Duration of Pathogenic Microbes in Water.*—Bobrow<sup>126</sup><sub>June, '04</sub> has ascertained the length of time that the typhoid and choleraform bacilli, the vibriion of Finkler and Prior, and the staphylococcus pyogenes aureus may remain alive at a temperature of 0, 2°, and 2.5° C. (32°, 35.6°, and 36.4° F.) in well-water, sterilized or unsterilized, and in distilled water, sterilized. He found the typhoid and choleraform bacilli to be the most persistent. For the typhoid bacilli the period was fifteen days; for the choleraform, eleven days in sterilized well-water. He found a diminution instead of an increase in the number of germs. Of the micro-organisms examined the typhoid bacillus best resists a low temperature.

*Practical Management of Gravity Sand-Filters.*—Piefke, engineer of the Berlin water-works, reports<sup>1</sup><sub>June 8, '04</sub> that green algæ, in any quantity, in unfiltered water, very soon obstruct the flow and necessitate the cleansing of the surface before forty cubic feet of water have passed through each square foot of sand-surface. Tests of both filtered and unfiltered water, by means of gelatin plates, should be made daily. Each filter-bed should be separately tested. The most favorable time for the test is after a filter has been working steadily for some hours. The pressure must not exceed four feet of water above sand-surface. The velocity of flow should not exceed four inches an hour. The filter is apt to work defectively (1) if there is no adequate provision for accurately regulating the flow; (2) if there is too high pressure; (3) if the fine-sand layer on top is not kept thick enough; (4) if sedimental coating is lacking. Silt affords an excellent sediment for filter-beds. Iron oxyhydrate comes next and is more efficient than algæ. Where these are relied upon for film-formation abundant light should be furnished.

The good results of water-filtration are shown at Warsaw, where the filter installed six years ago is still in effective operation.<sup>50</sup> The Vistula River water, which, before filtration, frequently shows as many as one thousand to two thousand germs to a cubic centimetre, is usually found, after filtration, to contain only twenty or forty. During the last cholera epidemic, while outbreaks occurred in villages and towns on both banks of the Vistula, no cholera focus formed in Warsaw. Typhus fever has been of rare occurrence since the installation of the sand-filter.

Sand-filtration shows good results only when the water contains mud or slime, which forms a deposit on the surface of the sand and so creates an effective filtering stratum. With water which does not form such a deposit sand-filtration is of no value, as is shown in the case of the Neva.

Of the house-filters, only the Chamberland and the Nordmeyer-Berkefeld give good results. Both become impure after a few days' use, in consequence of penetration of the bacteria through the walls of the filter. The Berkefeld is usually found to be infected after three days' use, the Chamberland after from five to seven. They should be sterilized by boiling for one hour after washing with a cloth in running water. The objection made to the Chamberland filter—that it allows the passage of microbes which it is intended to retain—is removed, however, by the results of some recent experiments with the André mechanical cleaner.<sup>457</sup> This apparatus, which cleans the filters rapidly and effectually, may be used daily, and the filter thus be kept at its maximum of effective operation. Under a pressure of twenty metres not a single microbe passed during a period of twenty days, and only an infinitesimal quantity at the expiration of twenty-seven days. The cleaner may be completely sterilized by the use of permanganate of potash in the proportion of 1 to 1000 parts. This salt colors the water pink; but when it runs clear there is no further danger and the antiseptic process is complete.

*Mineral Waters.*—Moisson and Gimbert<sup>996</sup> published an elaborate report on the microbiology of the table-waters most in use. They adopted in their investigations the exact methods of Roman and Colin. The bacilli which were the special objects of their search were the typhoid bacillus and the bacillus coli communis, the presence of which would indicate sewer-pollution.

The waters which they discovered to be most infected were: St. Galmier, a number of specimens of which contained colonies varying in number from 1000 to 10,000 per cubic centimetre; Vichy, of which three out of four specimens contained from 500 to 7000 liquefying colonies; and Vals water, which contained a heavy proportion of ordinary bacteria and some mold fungi. Apollinaris water showed under every test the highest degree of purity, being wholly free from pathogenic bacilli. In the discussion which followed the reading of this report before the Academy of Medicine of Paris <sup>May 12, '94</sup> Albert Robin remarked that the French Commission on Mineral Waters had pointed out in their report that the water of the Grand-Grille Vichy contained no microbes at the spring itself, but that it was contaminated in the bottling process. He likewise drew attention to the investigations of Minger, who had examined nineteen samples of American mineral waters and found that they all contained microbes in varying quantities: Imperial water contained 6 to 9689 germs in one cubic centimetre; Excelsior, 15 to 50,660 in one cubic centimetre; Colfax, 142 to 100,000 in one cubic centimetre.

*Hygiene of Potable Water.*—The hygienic study of water has the threefold object of co-ordinating the facts ascertained in regard to the etiology of microbic disease, of trying the reliability of the methods employed in determining the constitution of water, and of solving the problem of artificial purification of water. Cholera, yellow fever, dysentery, and typhus are the most striking examples of disease communicated by water, which has also been asserted, but without absolute proof, to be a vehicle of contagion for tuberculosis and cancer. Vidal and Chantemesse <sup>Sept. 12, '94</sup> have shown that the microbe of tuberculosis retains its vitality in sterilized water for more than seventy days. Epidemics of typhus have been traced continuously along the course of a particular water-supply. In March, 1887, a connection was clearly shown to exist between a supply of potable water and the outbreak of certain epidemics in Paris. It is still a question whether the pollution of cities, emptied into rivers or streams, is in itself the provoking cause of typhic infection, or whether the *coli communis* contained in water becomes transformed, under certain conditions, into the typhic bacillus. The subject is not susceptible of investigation in large cities where the local conditions are complex. It

should be studied in small communities when sudden and isolated outbreaks occur. Close observation under favorable conditions has invariably revealed the presence of a foreign and specific microbe simultaneously with the outbreak of an epidemic.

#### SOIL.

*The Soil in Relation to Health and Disease.*—In an exhaustive study of this subject George M. Kober, of Fort Bidwell, Cal., <sup>81</sup>May, '94 summarizes as follows the question of examination of a given locality as to its influence upon the population: A complete sanitary investigation should include the following points, viz.: 1. The configuration of the locality, height above the sea-level, angle of declivity, facilities for natural drainage, watersheds and courses, covering of soil by trees, brush-wood, and grasses. 2. Geological formation, dip and character of strata, especially in reference to their permeability. 3. Examination into the size of the fragments or grains composing the soil, readily conducted by means of graduated sieves and a low power of the microscope. 4. The porosity of the soil, usually determined by taking a litre (quart) of kiln-dried soil and ascertaining how much water is taken up. The water must be added until air-bubbles cease to form. This is a simple, but not the most exact, method. 5. The moisture of the soil, determined by weighing a certain quantity, then exposing it to a temperature of 220° F. (104.5° C.) until dry, and weighing it again; the difference is water or some volatile substance. 6. The capacity of the soil for holding water, ascertained by thoroughly wetting a certain quantity previously weighed. This is not a precise method. 7. The measurement of the ground-water, best indicated by the height of the water-level in wells. Pettenkofer uses a rod for shallow wells and a cord for deep wells. to which are attached a number of little cups which are let down into the well and drawn up again. 8. The ground-air, examined by sinking a shaft about sixteen feet deep, into which are placed lead pipes in one and one-half feet, three feet, seven feet, nine feet, and fifteen feet lengths and one-half inch in diameter. The soil is put back as nearly as possible into the original levels. The lead pipes are connected with an aspirator by means of rubber tubing, and the aspirated air is examined for the determination of oxygen, carbonic acid, ammonia, hydrogen



sulphide, and organic matter. The movements of the ground-air are determined by differential manometers. 9. Soil-pollution, determined by a chemical analysis for the estimation of nitrogen and carbon. A simple way to ascertain the percentage of volatile matter is to take 10 grammes ( $2\frac{1}{2}$  drachms) of dried pulverized soil, incinerate at a red heat, recarbonate with carbonic-acid solution or ammonia carbonate; heat again, to expel excess of ammonia, and weigh. 10. The micro-organisms of the soil, best determined by using a borer invented by Fränkel and constructed on the principle of a butter-tester. This borer must be sterilized and can be inserted to any desired depth. Upon withdrawal of the instrument Fränkel measures off, by means of a sterilized platinum spoon, a given quantity of the soil, and places it in a nutrient-gelatin culture-tube, and shakes the mixture well. A small quantity of this is placed on glass plates under a damp glass air-chamber; and, after the formation of the colonies, they are counted and isolated in the usual manner. The platinum measures hold about 2 grains (0.13 gramme) of soil, as a larger amount would render the culture experiment very difficult and confusing because of the number of micro-organisms present. 11. The temperature of the soil, readily determined at any desired depth by placing a self-registering thermometer, protected, in a "drive-well point joint."

*Aseptization of Infected Earth.*—Rabot, member of the Commission of Hygiene of Seine-et-Oise, <sup>211</sup><sub>Aug. 8, '94</sub> proposes to render aseptic the earth and mud removed in the process of draining lakes and swamps and constructing railroads through malarious districts by treatment with solution of sulphate of iron and quicklime. His process was put in operation for the cleansing of the Grand Canal in the park at Versailles and the lake of Saint Mandé.

#### SEWAGE.

*Disinfection of Sewage with Sulphuric Acid.*—Ivanoff <sup>15</sup><sub>Mar., '94</sub> reports the results of experiments in the disinfection of sewage with sulphuric acid. Sewage of different degrees of foulness was used. With Potsdam sewage, which was three times as foul as that of Berlin and slightly alkaline in reaction, 0.08 per cent. of sulphuric acid destroyed cholera bacilli in fifteen minutes. As compared with other chemicals sulphuric acid is second in point of cheapness, lime being first.

*Sewers: their Value and Dangers.*—In a paper read before the International Medical Congress of Hygiene and Demography at Budapest, Francis Stevens, of London, <sup>6</sup><sub>Sept. 8, '94</sub> explained his attempt at a systematic investigation to determine if work in sewers is injurious to the health of the laborers so employed. The men he questioned varied from 22 to 65 years of age and had served in sewers from eight months to twenty-two years. By far the greater number had not suffered from any fever resembling typhoid or from suspicious sore throats. Rheumatism and colds were the general complaints. The amount of time lost through illness among sewer men compares favorably with that of others who work for municipalities.

Overbeck de Meyer, of Utrecht, Secretary-General of the International Congress of Hygiene, in 1884, which met at The Hague, is of opinion that drainage by water-carriage has not been shown to have notably improved the health of towns. On the contrary, drainage into sewers has created new dangers, new complications, and a new series of accidents which constitute a formidable menace to the public health not only of towns, but of the surrounding country, which is infected by sewer-outfalls from large towns. Of all methods of disposing of sewage that of sewer-farms is the best. The pneumatic Shone system—by which the sewage is raised from the lower levels, thus creating sufficient fall to insure that the sewers shall be self-cleansing—has been adopted in Eastbourne and many other English towns, at Rangoon in India, Toulon in France, and Arod in Hungary.

Contrary views, however, are held as to the practical availability of sewage-farms for municipalities. <sup>1</sup><sub>June 1, '94</sub> They are considered unprofitable, unless under very favorable circumstances, as shown <sup>407</sup><sub>Mar. 3, '94</sub> by the sewage-farm of four hundred acres at Birmingham, England, which is carried on at a yearly loss of £30,000. Two special causes of this loss are: 1. The necessity of using eleven tons of lime daily to neutralize the unusual acidity of the sewage. 2. Insufficient fall for the sewage. Settling tanks and dredges have to be provided. Sewage purification by chemical precipitation is carried on at Worcester, Mass., on a larger scale than anywhere else in this country. About half of the total volatile residue and of the albuminoid ammonia are removed by the treatment, which also lessens the bacteria by 93 per cent.

The embarrassing question of the utilization of the sludge is not settled. Here, as in Europe, farmers are loth to employ it as manure, for it has only half the fertilizing effect of horse-manure. Cremation of sludge was effectual, as was demonstrated at the Columbian Fair. The electrozone method of purifying sewage or sewage-contaminated water consists in the addition of common salt (if enough is not already present) and liberating chlorine from this solution by means of an electric current. It is an expensive method of producing a solution of sodium hypochlorite. The report of the New York City Health Department for 1892 corroborates the observations of various European biologists to the effect that chlorinated soda and chlorinated lime are valuable disinfectants by reason of their active chlorine. Chlorinated lime is to be preferred in most cases. It is said by Traube <sup>58</sup> Feb. 8, '94 to destroy within two hours all micro-organisms in one litre (quart) of water, to which 0.00426 gramme ( $\frac{1}{15}$  grain) of fresh calcium salt is added. To neutralize the unused chloride of lime the subsequent addition of 0.00209 gramme ( $\frac{1}{32}$  grain) of sulphite of sodium is to be recommended. After this treatment the water is said to have an excellent taste, and it is rendered only about one English degree harder than before the calcium salt was added. If careful and repeated experiments with American sewage show that the small quantity of chemicals here indicated suffice to sterilize all disease germs and faecal bacteria of sewage, the process is certainly to be recommended as inexpensive. The above figures require less than 40 pounds (18 kilogrammes) of fresh chlorinated lime and 18 pounds (8.2 kilogrammes) of sodium sulphite for 1,000,000 gallons (4,000,000 litres) of sewage. The bisulphite of sodium is the most available antichlorine sold in this country and, in barrels containing somewhat more than 500 pounds (230 kilogrammes), sells in New York City for two cents and a half a pound. The same price is charged for the calcium salt in casks.

*The Hermite Electrical Process.*—Purification by electricity still continues to engage the attention of sanitarians. The first system in the field was the "Webster" process of passing through the sewage a strong electric current by means of iron electrodes. Disorganization of the constituents was claimed, as well as oxidation by nascent oxygen and chlorine oxides produced by the process. It gave fairly-satisfactory results at its trial by the

authorities at the borough sewage-works of Salford, several years ago. Of late, much attention has been drawn to the experiments performed by Hermite, at Havre, France. His process is based <sup>73</sup> <sup>203</sup> <sup>256</sup> upon the fact that, when an electric current is passed through sea-water, ozone, free chlorine, and various unknown oxygenated compounds of chlorine are set free, and that these possess a marked oxidizing and bactericidal action. The sea-water is brought into a tank at one end, an electric current of low voltage passes through it, and the electrolyzed water pours out at the other. This Hermite fluid (so called) was used in eight public water-closets as an experiment, and it was found that all odor in the collecting-vats was gone and that only a yellowish, turbid liquid remained. Experiments on typhoid dejecta in bacteriological cultures showed sterilization for a period of two days, after which small, discrete colonies of some unknown saprophytic bacillus began to develop. It is evident that this electrolyzed fluid is a very strong disinfecting agent; but the toxic properties of the effluent electrolyzed sewage need to be further studied before its merits as a public sanitary agent can be determined. In recent experiments with it at Worthing, England, under the personal direction of the inventor and supervised by Ruffer, <sup>2</sup> <sup>June 9, '94</sup> the disinfecting qualities of the process were clearly confirmed, but the practical tests showed that it failed in certain mechanical features only,—in the disintegrating of solid fecal matter. The commissioners advised that some device be added to accomplish this important object so that the electrolyzed fluid could act with greater effect and certainty. Until the character of the effluent is determined it is a grave question whether it would be safe to recommend its disposal into rivers. Its applicability to sea-side towns seems to be practical, but the question of utilizing it for inland municipalities suggests some important objections.

*Disposal of Sewage.*—Allen Hazen, of Lawrence, Massachusetts, read a paper, on “The Sewage-Disposal Problem in American Cities,” <sup>61</sup> <sup>Oct. 21, '93</sup> before the Public Health Association, in which he concludes that it is impossible, by any combination of chemicals, to secure the purification which approaches, even remotely, the result obtained by land treatment; but, when the problem is simply to keep the water into which the sewage flows reasonably clean, the result, with careful manipulation, is quite satisfactory. When,



however, the treated sewage finds its way into the source of the public water-supply, the effluent produced by even the most complete chemical precipitation cannot be regarded as an entirely unobjectionable addition, and such water should be further treated by filtration before use.

#### DISINFECTION.

*A New Detergent.*—The practice of washing linen with petroleum, <sup>26</sup><sub>July 2, '94</sub> which is said to be customary in some parts of Russia, has been introduced into a German military hospital: 15 grammes ( $3\frac{1}{4}$  fluidrachms) of petroleum are added to 15 litres (quarts) of water containing soap and lye, and in this mixture the linen is boiled. It does not then require hard washing, being bleached in the process of boiling. The expense is lessened by the smaller quantity of soap required. The chief of the medical army staff has directed trials to be made on the above plan at all the military hospitals in Germany.

*Technique of Experimental Disinfection.*—The material generally selected for the fixation of bacterial material for experimental purposes has been silk thread. Silk holds the disinfectant so tenaciously that mere washing will not suffice to remove it. Cover-glasses have the advantage of being readily cleansed, but are expensive. Spirig <sup>50</sup><sub>June 16, '94</sub> has experimented with filter-paper, with good results. Walliczek states that he has found it to be open to the same objection as the silk thread,—of retaining the disinfecting material.

*Local Disinfection by the Spray.*—Experiments undertaken to determine the value of disinfection by means of the spray of antiseptic solutions are, so far, somewhat inconclusive in their results. Guttman and Merke <sup>10</sup><sub>July 24, '94</sub> impregnated silk threads with anthrax bacteria. These threads, dried and attached to the wall, were subjected to antiseptic spray. After desiccation they were placed in a suitable culture in order to determine if the virus were destroyed. Out of seventy-five threads so impregnated and subjected to the spray of a solution of sublimate in the proportion of 1 to 1000, thirty-four were found to be sterilized and forty-one produced cultures. Guttman and Merke consider these results favorable in view of the fact that in practice it is rarely necessary to destroy spores in the quantities experimented on. Esmarch <sup>58</sup><sub>p. 491, '87</sub> considers the results of his own experiments in this direction as

negative and prefers disinfection of walls by means of bread-crumbs. This process is extensively practiced in Germany. Bordoni Uffreduzzi obtained good results by spraying the wall with a 3 to 100 solution of bichloride of mercury acidulated with hydrochloric acid. At the conclusion of the process he protected the wall against further contamination, scraped it after desiccation, and sowed the proceeds of the scraping in bouillon. It is apparent, from the descriptions herein given, that Bordoni Uffreduzzi, Guttman and Merke, and Esmarch, in scratching the wall experimented upon, detached some particles of bichloride, which probably prevented the development of the germs. Laveran and Vaillard report the results of their experiments on small bricks covered with paper which they contaminated with various pathogenic microbes and subjected to the spray of bichloride solution, 2 to 1000. They obtained cultures with all the microbes employed without having previously taken the precaution of neutralizing the excess of bichloride by means of ammonia. They state that the spray of phenic acid, applied for one minute, seldom failed to destroy the bacillus of Eberth, the bacillus of diphtheria, the streptococcus pyogenes, the bacillus of blue pus, and the ordinary microbes of sputum. The sporulated bacteridium of anthrax alone resisted. Similar results were obtained with solutions of lysol in the proportion of 5 to 100 and cresyl in an emulsion of water of 4 to 100. These solutions rapidly corrode the apparatus, stain the wall, and emit a highly-disagreeable odor. They are probably unfit for practical use. Results from the use of liquid chloride of lime were unsatisfactory. Laveran and Vaillard state their preference for the washing of walls with soap and water and afterward with bichloride, over the scraping with bread, which is generally practiced in Germany. The former process is possible only when the wall is hard-finished. With walls covered with paper the only resource is fresh papering. All localities which are liable to contamination—hospitals, barracks, schools, hotel-chambers, etc.—should have hard-finished walls. In disinfecting with spray the liquid disinfectant should run down the wall.

*Peroxide of Hydrogen as a Disinfectant.*—Traugolt<sup>26</sup>  
July 16, '94 reports some experiments made by him with peroxide of hydrogen and trichloride of iodine, with the view of the substitution of these substances for carbolic acid and bichloride of mercury. A disin-

fectant for habitual use must conform to the following requirements :—

It must not be a poison, it must not have a disagreeable odor, and it must be cheap. Carbolic acid and bichloride of mercury fail in the two first conditions. Peroxide of hydrogen appears to meet all the requirements of an efficient disinfectant. It may be used to advantage in all processes heretofore conducted with carbolic acid and bichloride.

The trichloride of iodine is innocuous, but inferior to peroxide of hydrogen in degree of energy. It is not inodorous and is more expensive than carbolic acid.

The soluble salts of copper, especially the bichloride, possess remarkable disinfecting properties. The bichloride of copper destroys anthrax spores in less than thirty days and checks sporulation in five days. In the treatment of wounds the bichloride is much to be preferred to the sulphate usually employed.

#### ALIMENTATION.

*Milk.*—The literature on the subject of alimentation this year follows the trend of the past few years in the general direction of the use of milk for human food, its supply, sources and character. This subject occupies the attention of the great majority of writers throughout the world in the department of Public Hygiene.

Hough, <sup>339</sup><sub>Sept., '93</sub> in an article on "Inspection and Regulation of Dairies," sums up thus: "The most essential part of milk-inspection commences at the dairy, where sanitary surroundings and the health of the milch-cow are to be the *sine qua non* toward securing a wholesome and nutritious kind of milk. Since it is widely known that the cow is predisposed to consumption, tuberculous cows should be sought out and quarantined. Wherever any contagious disease exists in the immediate vicinity of a dairy, the dairymen should be prevented from taking their milk to market until such time as the health officer shall deem it safe and prudent."

Prolonged lactation of cows should be prevented, since the milk is less nutritious and apt to be from diseased cows. Old cows, where lactation has been prolonged, should be made to discontinue the function. The health officer should regulate, to a certain extent, the quantity and quality of the food furnished

milch-cows. The water-supply should be examined into with especial care.

Hird <sup>1058</sup><sub>Dec., '93</sub> says, in relation to prosecution for adulteration of milk, that a legal standard is necessary and that standard based on a compilation of a large number of analyses should be 12.5 per cent. total solids, with 3.5 per cent. fat and 9 per cent. solids not fat. Having established these numbers as the legal standard, a certain amount of discretion should be exercised by the analyst. As previously stated, the specific gravity should not fall below 1.029 unless exceptionally rich in fat. The addition of 1 per cent. of solids not fat increases the specific gravity of the milk by 0.004, while the addition of 1 per cent. of fatty matter decreases the specific gravity by 0.001. Therefore, if we take some distilled with a specific gravity of 1 and add 9 per cent. solids not fat, our specific gravity becomes 1.036. Then the addition of 3.5 per cent. of fat decreases this number 0.0035, or to 1.0325; so that the specific gravity of milk consisting of 12.5 per cent. total solids and 3.5 per cent. fat should be 1.0325. If 2 per cent. of fatty matter have been removed, leaving only 1.5 per cent. fat, then the specific gravity goes up to 1.0345. In case water has then been added to reduce the gravity to 1.0325 again, we shall find that the solids not fat which had remained practically stationary before have now been reduced to about 8.5 per cent., or a reduction of 0.5 per cent., which is about 6 per cent. of the entire amount of solids not fat, showing that 6 per cent. water has been added.

The problem of a pure milk-supply resolves itself into a question of minute attention to the hygiene of cattle-farms and dairies. In this connection, a recent report on the system of the Copenhagen Milk-Supply Company is of interest. <sup>6</sup><sub>Sept. 15, '94</sub> The guarantees given by the company, of the purity of the milk furnished by them, are: 1. Veterinary control of all the cows on the farms and the exclusion of the milk from suspected animals. 2. Cooling of the milk by ice to 41° F. (5° C.) or lower. 3. Filtration of the milk through fine gravel. 4. Absolute cleanliness of all bottles and cans used in serving milk.

All the cows are fed in summer, in the open fields, on grass and clover. Stall-feeding is practiced only in winter. The cows are segregated in small herds for the convenience of examination as to their physical condition. The parts subjected to examina-



tion are the udder, skin, glands of the neck, the axilla, and the inguinal region. If a tuberculous cow is detected it is removed from the herd.

The filtering-medium is fine gravel placed in perforated tin trays. The amount and nature of the impurities retained by the gravel demonstrate the necessity for this process. The milk is drawn off into bottles which have been cleansed by means of soda and a jet of steam, and is guaranteed to keep twenty-four hours.

That disease can be communicated by infected milk cannot be doubted. A notable case of this was observed in 1880 at Strasbourg, Germany, <sup>19</sup><sub>July 19, '94</sub> where an epidemic of typhoid broke out in two prisons in which there had not been a case of the disease for twenty years. Milk is one of the best media for the multiplication of typhoid bacteria, and the fact that these bacteria produce no visible alteration in the milk by which their presence may be detected increases the facility of their entrance into the system.

Villon, <sup>121</sup><sub>May, '94</sub> in prosecuting experiments in aging brandies by the use of oxygen and carbonic acid under pressure, was led to experiment on the preservation of milk in a fresh state. His process was to inclose fresh milk in a tight vessel, compress it with oxygen to destroy the germs, and, finally, draw it off in cans of 100 litres' (quarts) capacity, under pressure of two atmospheres. In this condition, he claims that milk will remain in a perfect state of preservation during a voyage lasting several months. It supports a heat of 80° or 100° C. (176° to 212° F.) without coagulating; whereas fresh milk ordinarily curdles at a temperature of 50° or 75° C. (122° to 167° F.). Villon states that he has sent milk from Lyons to London and had it returned. On its return it showed no sign of germ-ferment and had the taste of fresh milk.

In the course of some experiments in sterilizing milk, Leichmann <sup>50</sup><sub>July 23, '94</sub> observed various striking characteristics of fermentation in milk kept for a length of time in the incubator, at a temperature of 50° C. (122° F.). The fermentation occurred after complete liquefaction had set in, and was accompanied by an abundant liberation of gas. The organism was isolated in the form of a slender, motionless bacillus, with rounded extremities. It was

colored with the usual aniline dyes and clearly distinguished from its inclosing capsule. Cultivated in agar at 37° to 40° C. (98.6° to 104° F.), the colonies of bacteria exhibited activity. In an oblique light they were found to possess refracting properties. This, together with the tendency of the round colonies to form quadrants of a changeable, clear, and dark color are stated as characteristic tests for the recognition of this organism. The maximum growth and activity of the bacillus lies between 45° and 50° C. (113° and 122° F.) At 55° C. (131° F.) both cease. Two hours' exposure to 70° C. (158° F.) destroys its vitality.

Thörner <sup>50</sup><sub>July 23, '94</sub> reports the identification of a bacillus which occasioned a fetid odor in milk subjected to him for examination. It occurred in the form of a grayish-white fungous growth and was probably communicated to the milk-vessel by the atmosphere of the stall. It is probably identical with the bacillus fetidus lactis observed by Jensen and Lunde and considered by them as the cause of the fetid odor observed by them in butter and milk.

Alfonzo Montepisco, <sup>757</sup><sub>Sept., '93</sub> in an article upon the milk of Naples, calls attention to one feature of the public supply,—the leading of the milk-bearing animals into the city, where they are placed at the disposal of their customers and milked at the doors. This, of course, insures against adulteration, but not necessarily against the impurity of the supply.

*Typhoid Fever from Oysters.*—The epidemic of typhoid fever at Wesleyan University, Middletown, Conn., in October, 1894, showing a development of twenty-three cases and four deaths, disclosed the unique fact, as shown by the report of W. H. Conn, that <sup>146</sup><sub>Dec. 14, '94</sub> the ingestion of raw oysters was responsible for the appearance of this disease among the students. All probable and possible sources of infection—milk, water, plumbing, etc.—were in turn eliminated upon investigation, and it was found at last that all the sick belonged to three college fraternities and had partaken of raw oysters at an annual society banquet on a certain night. These oysters were purchased of one dealer. Four other societies, which held banquets simultaneously and did not have raw oysters on their *menu*, escaped entirely. Certain students from Yale College, in attendance at the suppers where oysters were served raw, were also attacked by the disease. Inquiry was made at once as to the

source of the oysters, and it was learned that, while they had grown in the deep waters of Long Island Sound, they had been deposited in the mouth of a fresh-water creek for a day or more to freshen. This freshening, as is well known, consists in the absorption by the oysters of fresh water, which causes them to swell up and become plump. These oysters had thus been fattened before being sent to Middletown. Further inquiry showed that within about four hundred feet of the place where they had been deposited was the outlet of a private sewer coming from a house wherein were two cases of typhoid fever. The persons in question were a lady and her daughter. They were taken sick at such a period as to call in a physician for the first time October 11th, which, of course, means that the disease had been in its period of incubation for probably considerably over a week earlier. The oysters were sent to Middletown upon October 10th, and therefore they were deposited at this place at exactly the time to receive contamination during the early days of these two cases of typhoid.

Such a source of infection has for some time been suspected, but not demonstrated; and that Conn is justified in his conclusion, that the practice of fattening oysters in the mouths of rivers and in the vicinity of sewers is dangerous to public health, is beyond question shown by the combination of conditions which have made it possible to trace the Wesleyan typhoid outbreak to the eating of infected raw oysters.

This well-marked instance should engage the attention of local health authorities to ascertain the location of oyster-beds, with a view of their possible source of contagion.

*Yeast Substitutes.*—So largely has baking-powder come to be used in the place of the old-fashioned yeast that greater attention should be given to its composition. The Court of Appeals in England has recently decided that baking-powder could not be considered an article of food within the meaning of the Food and Drug Act. The effect of the decision relieves the manufacturer who uses alum in the place of the higher-priced tartaric acid—for the purpose of freeing carbonic acid from the sodium bicarbonate—of the charge of an offense against the law. The *Lancet's* Special Analytical Sanitary Commission on Yeast Substitutes has submitted the following conclusions <sup>6</sup> upon the subject: Good  
Mar. 3, '94

baking-powder may be divided into two classes, viz.: (1) those in which tartaric acid ( $\text{H}_2\text{C}_4\text{H}_4\text{O}_6$ ) is used to displace carbonic acid from the bicarbonate of soda ( $\text{NaHCO}_3$ ); and (2) those in which acid tartrate of potassium ( $\text{KHC}_4\text{H}_4\text{O}_6$ ) is made to perform the same office. In the former case the following equation serves to illustrate the reaction:  $\text{H}_2\text{C}_4\text{H}_4\text{O}_6 + 2\text{NaHCO}_3 = \text{Na}_2\text{C}_4\text{H}_4\text{O}_6 + 2\text{H}_2\text{O} + 2\text{CO}_2$ , while in the latter the change may thus be represented:  $\text{KHC}_4\text{H}_4\text{O}_6 + \text{NaHCO}_3 = \text{KNaC}_4\text{H}_4\text{O}_6$  (Rochelle salt) +  $\text{CO}_2 + \text{H}_2\text{O}$ . Free tartaric acid was present in twelve of the twenty specimens examined, and cream of tartar (acid tartrate of potassium) in six. The former generally yielded a larger volume of carbonic-acid gas and with greater rapidity,—a result which is doubtless due to the comparatively quick solubility of tartaric acid. The disengagement of gas from the alum powders was, however, slow, the change taking place being represented by the following equation (assuming that potash alum is used):  $\text{K}_2\text{Al}_2(\text{SO}_4)_4 + 6\text{NaHCO}_3 = \text{K}_2\text{SO}_4 + 3\text{Na}_2\text{SO}_4 + \text{Al}_2\text{O}_3 + 6\text{CO}_2 + 3\text{H}_2\text{O}$ . The salts remaining behind in alum powders on the completion of the reaction are therefore the sulphates of potassium and soda with alumina, or probably hydrated oxide of aluminium. The quantity of carbonic acid given off by the tartaric-acid powders ranged from 54 to 11 times the volume of the powder, the average amount being 25 volumes of gas. Similarly the cream-of-tartar powders yielded from 20 to 9 times their volume of carbonic acid, the average being 13. The alum powders yielded, respectively, 7 and 11 volumes of carbonic-acid gas. Although these great variations occur in the amount of gas evolved, yet the quantity of powder recommended to be used is the same in the majority of cases, viz., 1 heaped teaspoonful to 1 pound of flour. In all the specimens analyzed the end reaction was decidedly alkaline; so that carbonate of soda is generally in slight excess. Except in one instance, in which sugar of milk is evidently substituted, starch (commonly rice) is a usual constituent of baking-powders, and is doubtless employed as an excipient.

The *Lancet*, in commenting upon this Act, well says: "It is an utterly illogical condition of things that, while the Act provides against the use of alum in bread, it offers no remedy against the employment of the same agent in baking-powder, since the latter is used for one, and only one, purpose, viz., that of mixing it



with certain food-materials with the object of rendering the cooked product attractive in appearance, porous, and light."

*Butter*.—Raumer<sup>996</sup><sub>May 10, '94</sub> examined a sample of butter, made in June, 1888, for volatile acids, which gave then the total of 26.8 and 26.9. In October, 1889, the butter gave 28.5 and 28.8; in February, 1890, it gave 31.6 and 31.9, and in January, 1892, it gave 30.3 and 30.1. The proportion of free acids in 1892 was considerable, even neutralizing 21 cubic centimetres ( $5\frac{1}{4}$  fluidrms.) of the normal solution of potash; but there was not any marked diminution in the proportion of the volatile fatty acids. In the matter of rancidity, the results of recent experiments reported by Arata<sup>126</sup><sub>July 16, '94</sub> show that it is due chiefly to the effect of light. Micro-organisms have small part in the process, which is purely chemical.

*Tuberculous Meat*.—Bollinger draws attention<sup>69</sup><sub>No. 50, '93</sub> to experiments tending to show that the blood of cattle suffering from tuberculosis is infectious. Of ten guinea-pigs inoculated with the blood of recently-killed animals one became tuberculous. The flesh of the animal from which the blood was taken was allowed to be exposed for sale, and Bollinger points out that, as the muscles must always contain a certain amount of blood, there is probably a not insignificant danger of tuberculosis being thus spread.

*Mushrooms*.—The Government Printing-Office at Washington has lately issued an important pamphlet by Thomas Taylor, of the Division of Microscopy in the Department of Agriculture.<sup>2121</sup><sub>'94</sub> The importance of the subject need not be insisted on to the few who know how immensely superior the American mushroom is to that imported from Europe. Taylor enumerates the following species: *Lactarius deliciosus*, *Cantharellus cibarius*, *Marasmius oreades*, *Hydnum repandum*, *Agaricus campestris*, *Coprinus comatus*, *Morchella esculenta*, *Clavaria cinerea*, *Clavaria rugosa*, *Boletus edulis*, *Lycoperdan giganteum*, and *Fistulina hepatica*.

It is not sufficient to learn to distinguish between noxious and edible mushrooms, since those which are edible are liable to be attacked by insects which impart to them poisonous properties. In all cases mushrooms should be treated, before cooking, with salt and vinegar. Thus treated, even the *Amanta muscarius* is eaten with impunity by the Russian peasants.

*A Ptomaine in Sardines.*—Griffiths <sup>126</sup><sub>July 15, '94</sub> reports the isolation, from putrefied sardines, of a new ptomaine which he names sardinine. It is colorless, crystalline, soluble in water, and slightly alkaline. It forms precipitates with chlorides of platinum or gold, and with phosphomolybdic, phosphotungstic, and picric acids. With hydrochloric acid it forms a white hydrochlorate. Sardinine is a poison, producing vomiting and intestinal disturbances which are frequently fatal. It is the cause of the symptoms of poisoning due to eating sardines put up in cans that are not air-tight.

*Adulteration of Lard.*—Experiments conducted by Neufeld show <sup>126</sup><sub>July 15, '94</sub> that lard may be considered pure when its iodine number fluctuates between 46 and 61. He also calls attention to the fact that it varies in composition according to the part of the animal from which it is taken. Differences in the iodine figuration may be accounted for by the difference between lard taken from the intestines and that taken from the loins of the animal.

*Canned Meat.*—Hasterlik, Jungers, and Brautigam and Edelmann <sup>126</sup><sub>July 15, '94</sub> have proposed methods of determining whether the preparations put on the market under the designation of canned beef consist of beef or horse-flesh. The Hasterlik method is based on the power of absorbing iodine possessed in different degrees by the fat lying between the muscular fibres. The meat is freed from visible fat and cut in fine pieces, which are dried for fifteen hours at a temperature of 100° C. (212° F.). From this a dry substance is extracted by a process conducted in a refrigerator, and lasting six hours. From this substance a fine powder is extracted in the Soxhlet extractor, the second process lasting also six hours. The exposure to iodine is conducted by the von Hübl method, with alcoholic solution of iodine in presence of bichloride of mercury. The power of absorption for horse-meat was found to be 82.23 and for beef 54.37,—a difference sufficiently marked to establish the nature of the meat examined. The meat of all other slaughter-house animals shows a lower figure than that of the horse.

The method proposed by Brautigam and Edelmann utilizes the reaction of horse-meat to iodide of glycogen. A bouillon of the meat is prepared. This, when cooled, treated with nitric acid, and filtered, is treated with warm iodized water carefully poured

into the broth. Horse-meat presents a violet or reddish-purple ring at the point of contact of the two liquids,—a reaction never observed with other meats. Jungers proposes, as a test for horse-flesh, the configuration of the fatty cells, which differs in the different varieties of butchers' meat.

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#### EPIDEMIOLOGY.

*Cholera.*—The epidemic of this dreaded disease during the past year has been confined to the Eastern Hemisphere. Thus far it has not reached across the Atlantic. This year's manifestations, as shown by the geographical tabulation which will follow, reveal a persistent type, but scattering in its character. It has been most prevalent in Austria-Hungary, the cases in several of the districts numbering more than 1000; 55 governmental districts in that country showed infection during the year. In Belgium 38 provinces and communes were infected, and in Liège alone 277 deaths were reported in the three summer months. France practically escaped, with the usual exception of Marseilles, where the disease seems to be endemic. In Germany 86 districts and villages reported cases of cholera, a few in each place, but not characterized by great mortality. The district of Silesia exhibited the largest record of 231 cases during the period from May to October. In Holland over 50 communes showed cases, Maestricht leading with 176 cases and 84 deaths, and Amsterdam next with 100 cases and 35 deaths; but the general character of the epidemic in that country was of a mild type,—a few cases in each commune, with mortality up to the rate of more extensive and severe epidemics. In Russia the disease seems to be as intractable as ever, the reported cases in many of the governmental districts running up into the thousands, with a mortality-average not far from 50 per cent. Kielce reported 7168 cases, 3596 deaths; Petrikov, 4484 cases, 2320 deaths; Radom, 6097 cases, 3059 deaths; St. Petersburg, 4512 cases, 2214 deaths; Warsaw, 5971 cases, 2963 deaths; and 8 other districts, ranging from 1334 cases, 573 deaths, to 2022 cases and 1034 deaths. The extent of the infected region seems not to diminish, and the fewer cases may perhaps be attributable to the lack of supply, as the frightful mortality of 1892, followed by the scarcely less fatal

epidemic of 1893, must have reduced the population seriously in many of the districts. In Turkey the provinces of Angora, Erzeroum, Mahmurat el Aziz, Konia, and Sansoum suffered severely, the latter having reported 5325 cases from April to August.

CHOLERA, MAY 15, 1894, TO JANUARY 1, 1895.

(As reported to the Supervising Surgeon-General, Marine-Hospital Service.)

PLACES.	DATE.	CASES.	DEATHS.	REMARKS.
Arabia :				
Mecca . . . . .	June 11 . . . . .			Cholera reported.
Argentine Republic . . . . .	Dec. 28, 1894 . . . . .			Cholera reported.
Austria-Hungary :				
Bukowina . . . . .	. . . . .	15,917	8,746	{ From beginning of epidemic to December 31.
Galicia . . . . .	. . . . .			
Belgium . . . . .	June 1-Nov. 17 . . . . .	2,694	1,266	
Brazil . . . . .	Nov. 27-Dec. 26 . . . . .			Cholera reported.
Ceylon . . . . .	Aug. 11 . . . . .			One death on steam-ship <i>Natal</i> .
China . . . . .	June 23-Oct. 11 . . . . .		2	
England . . . . .	July 28-Aug. 18 . . . . .	5	1	
France . . . . .	May 28-Dec. 28 . . . . .		173	
Germany . . . . .	May 25-Dec. 31 . . . . .	997	323	
Holland . . . . .	July 11-Dec. 8 . . . . .	539	265	
India . . . . .	May 16-Dec. 31 . . . . .		907	
Italy . . . . .	Aug. 31-Nov. 6 . . . . .	2	1	
Japan . . . . .	July 14-Aug. 18 . . . . .	6	3	
Russia . . . . .	Apr. 28-Dec. 31 . . . . .	65,978	30,069	
Spain . . . . .	Aug. 9 . . . . .	1	1	
Sweden . . . . .	July 4-Aug. 19 . . . . .	29	5	Quarantine station.
Turkey . . . . .	Mar. 19-Dec. 31 . . . . .	10,710	4,798	

*Grippe as an Epidemic.*—In a thesis on this subject Hulman<sup>996</sup> June 25, '94 says that there are three points of view from which grippe may be considered: 1. As a disease having a specific germ. 2. As due to the presence of some microbe already recognized,—as, for example, the streptococcus or the pneumococcus,—which has acquired special properties and virulence under epidemic conditions. 3. As an etiological condition, the genesis of which is unknown and which favors the introduction into the system of secondary affections. In epidemics of grippe two important phases are to be noted, viz., origin and development. Its origin is connected with causes which entirely elude our observation. Localized in the eastern part of Europe and in southwestern Asia, these unknown causes appear to be independent of temperature, of barometric pressure, of dampness, ozone, water-levels, and all known telluric and meteorological conditions. The development of a grippe epidemic can be accounted for only by contagion. The means of contagion are uncertain, but they are presumably external objects,—water, air, sputum, etc. Sporadic grippe, like epidemic grippe, originates within narrow local limits and con-



ditions and differs from the epidemic form only in degree of virulence.

*Tuberculosis.*—An editorial<sup>1154</sup><sub>June, '94</sub> gives the following views, which indicate the recent advances in public enlightenment as to dealing with the disease: "There are three methods by which the bacillus may enter the system,—by inhalation, by ingestion, and by inoculation. Cases have occurred of unintentional inoculation of previously healthy persons, in which slight injuries—for example, the extraction of a tooth, an incised wound, and the like—have given rise to secondary swellings of adjacent glands, which were found to contain giant-cells with tubercle bacilli in the interior. Meat and milk from tuberculous cows may produce tuberculosis in the human subject, and human tuberculosis may cause consumption in fowls and cattle. The most common means of infection is by inhalation. The sputum from consumptives has frequently been pulverized and sprayed into a room, and animals that have breathed the dust have contracted the disease and died. Gautier, a French physician, accidentally breathed the sputum-dust upon which he was experimenting and contracted consumption. The sputum is undoubtedly the agent which conveys the infection. Experiments made by Cornet, of the Berlin Hygienic Institute, show that sponge-scrapings from the walls of rooms occupied by consumptive patients, inoculated into guinea-pigs, produced consumption in those animals. The scrapings contained dry sputum. Schrill and Fischer inoculated animals with dried sputa one hundred and twenty-six days old and all contracted the disease. The germs contained in sputum retain their virulence nine or ten months. In the dried state they are more dangerous than in the moist, as they are then disseminated by currents of air. When it is considered that consumptives are constantly expectorating along our streets and on the floors of public buildings,—post-offices, hotels, railroad-cars, and street-cars,—and that the germs contained in dried sputum are carried into the air by every passing breeze, and that they are capable of producing the disease six months after drying, an idea may be formed of the menace to health and life from this one agent of infection. Prevention may be accomplished in two ways: first, by the education of those infected as to the nature of the disease, so that they will willingly take the necessary precautions to avoid infecting others;

second, by the enactment of laws by the boards of health, requiring registration of every case. The State Board of Health of Michigan passed a resolution, September 29, 1894, requiring returns to be made and stating that diseases due to the bacillus tuberculosis should be included in the official list of dangerous diseases. Isolation of patients was not required. The Board of Health of New York City is now taking measures to prevent the spread of tuberculosis in New York. It disinfects all premises which have been occupied by a consumptive or vacated by death or removal, and makes a bacteriological examination of sputa of all suspected cases.

No consumptive should expectorate upon the floor, but should be provided with proper cups to receive the sputa, and these cups should be afterward disinfected. The consumptive should carry small pieces of cloth, each large enough to receive one sputum, and paraffined-paper envelopes or wrappers in which the cloth, as soon as used, may be put and securely closed and, with its envelope, burned at the first opportunity. Cuspidores, in hotels and other public places and in rooms occupied by consumptives, should be partly filled with carbolized water. They should be washed each day in boiling water and the contents disinfected with corrosive sublimate. It should be distinctly understood that the breath of tuberculous patients and the moist sputum received into proper cups are not elements of danger, but only the dried and pulverized sputum. Heller states that a consumptive may expectorate 7200 million bacteria a day. If these can be destroyed consumption will cease to exist. The rapid advancement in sanitary measures justifies the hope of greatly reducing the number of consumptive deaths.

*Vaccination.*—There is no more interesting and important point in the study of vaccination, says a writer,<sup>10</sup> than the degree of virulence in the vaccine animal. On this virulence depends the prophylactic value of vaccination. It is indicated by the characteristics of the vaccinal exanthema, and can be estimated only according to these characteristics. If the virulence is moderate the evolution of the exanthema is slow. Nothing is observed until the third day. On the fourth day the indurated zone surrounding the scarifications may be felt between the finger and the thumb. On the fifth day a slightly-red swelling appears around the edges of the incision. On the sixth or seventh day a thin,

brown scab forms, covering the whole space of the scarification. There are no general symptoms. A greater degree of virulence is marked by more decided local and general symptoms, more rapid evolution, more pronounced tumefaction, and darker color of the red areola, together with greater sensitiveness to the touch. The animal seems oppressed and tired, loses appetite and weight, remains lying down, and exhibits other general symptoms. In cases of excessive virulence all the general and local symptoms described are exaggerated.

Schrokamp <sup>51</sup><sub>Feb., '94</sub> reports the results of his observation of the danger from inoculation with human virus as follows: Syphilitic infection, skin diseases, and leprosy may be communicated by vaccination. Erysipelas may be caused by septic infection from lack of care during the operation or in the management of the wound. Rachitis, tuberculosis, and scrofula cannot be transmitted, and there is no proof that measles, scarlatina, or diphtheria can be so transmitted.

Cochazko <sup>229</sup><sub>May, '94</sub> reports that, having vaccinated a child suffering from whooping-cough, he soon noticed a marked improvement in the child's condition. From this he was led to try the effect of vaccination in five other serious cases with equally good results. In 1890, when variola and influenza prevailed at Madeira, Goldschmid found that vaccination and revaccination conferred an immunity from influenza. Jenner, in a letter to a young Scottish landlord, who had written to him that distemper in young dogs was decimating his pack, advised vaccination of all the dogs without distinction. The disease was thus checked.

It is advisable, in times of epidemic, to prescribe the preventive use of the arseniate of strychnine and the hydroferrocyanate of iron, which are vital agents. They render the subject less susceptible to contagious fevers.

Layet, of Bordeaux, <sup>6</sup><sub>June 23, '94</sub> furnishes the results of his observation of two thousand cases of small-pox with reference to age and revaccination. Up to the age of 10 years no cases of variola were observed in persons who had been revaccinated. Between the ages of 10 and 20 years the disease was rare in the revaccinated and never resulted fatally. The proportion of persons vaccinated, but not revaccinated, between 20 and 50 years of age is much greater. Mortality among this class is three times

that of the once vaccinated patients between 10 and 20 years of age. Above the age of 50 years the mortality of the unvaccinated is at its maximum.

*Small-pox.*—In an address delivered before the Epidemiological Society of London, <sup>6</sup><sub>Feb. 3, '94</sub> John C. McVail considers the subject of the atmospheric distribution of small-pox germs from hospitals where cases of this disease are treated. His conclusions are: That, as a result of the simultaneous action of causes favorable to the spread of infection, the contagion of small-pox may sometimes be conveyed atmospherically to a distance much greater than had been usually admitted,—a distance measurable by quarters of miles. In endeavoring to summarize the agencies which have to do with this result it is necessary to bear in mind that other unknown agencies may also be involved, and that sometimes the joint action of all the known agencies may not be necessary, special activity of some, perhaps, atoning for relative deficiency or absence, and *vice versâ*, of others. Keeping this in view the factors whose coincident operation can produce the result in question may be subdivided as having to do with (1) the contagion, (2) the atmosphere, and (3) the population. 1. There must apparently be intensity of virus depending on (*a*) the period of the epidemic, a rising epidemic being important; (*b*) concentration of acute cases as centres of infection; and (*c*) possible minor waves of epidemicity referring to particular days or weeks, these waves constituting flood-tides of infectivity. 2. (*a*) A foggy condition of atmosphere or light winds appear to be of consequence, as observed both by Waterhouse and Power; and (*b*) possibly only the atmosphere of towns or cities may possess the necessary carrying power. No good evidence has yet been adduced of such occurrences in connection with hospitals situated in rural districts; but, no doubt, the failure here may be as much owing to want of population as to atmospheric condition. 3. Bearing in mind the conclusions arrived at by Whitelegge in his Milroy Lectures, it may well be the case that part of the influence of a rising epidemic is due to the existence in any special area of a greater or less number of persons specially susceptible to small-pox and easily infected by its first active onset. The supply of such persons would be rapidly diminished or exhausted, and would not be renewed in the course of any single epidemic.



This year has shown quite an extensive appearance of small-pox throughout the eastern portion of the United States, and in some cities, notably Chicago and Milwaukee, the situation assumed grave epidemic form and for awhile taxed the resources of the local health authorities to the utmost to prevent its spread. The Chicago epidemic has been a continuance of the many scattered cases occurring in 1893. It showed recrudescence in January, when 188 cases with 29 deaths occurred. February showed 233 cases and 55 deaths; March 305 cases, 95 deaths. April over 500 cases, May about the same; June showed a decrease, and July still more, until it gradually spent its force by early autumn. The local authorities enforced general vaccination, using 626,300 points in about five months, and the Marine-Hospital Bureau sent inspectors to visit the shipping and vaccinate crews. In Milwaukee the epidemic broke out in January and rapidly spread amongst the foreign population, who resisted attempts to enforce the laws relating to vaccination. During the year about 650 cases with 175 deaths were reported in the city, and in the State of Wisconsin about 200 cases occurred in the same period, with a mortality of about 25 per cent. Small-pox showed itself in the States of Vermont, Indiana, Michigan, Illinois, Maryland, Minnesota, New Jersey, Ohio, New York, Pennsylvania, and the District of Columbia. At the close of this report there were still in hospital at Chicago and Milwaukee a number of cases of small-pox under treatment,—the remains of the great epidemic.

SMALL-POX IN THE UNITED STATES, OCTOBER 10, 1894, TO DECEMBER 31, 1894.

(As reported to the Supervising Surgeon-General, Marine-Hospital Service.)

PLACES.	DATE.	CASES.	DEATHS.	REMARKS.
<i>Connecticut:</i> Groton . . . . .	Dec. 5 . . . . .	1		
<i>District of Columbia:</i> Washington . . . . .	Oct. 15-Nov. 22 . . Nov. 22-Dec. 27 . .	16 11	5	
<i>Illinois:</i> Chicago . . . . . Sandwich . . . . .	Nov. 26 . . . . . Nov. 7-Dec. 10 . . .	65 15	. . . .	In small-pox hospital.
<i>Indiana:</i> Walkerton . . . . .	Nov. 8 . . . . .	3		
<i>Maryland:</i> Charles County, near Glymont . . . . .	Oct. 27-Nov. 22 . .	3		

SMALL-POX IN THE UNITED STATES.—*Continued.*

PLACES.	DATE.	CASES.	DEATHS.	REMARKS.
<i>Michigan:</i>				
Adrian Township . . . . .	Nov. 23 . . . . .	1	1	
Cheboygan . . . . .	Oct. 19 . . . . .	2		
Chester . . . . .	Dec. 10 . . . . .	1		
Danby Township . . . . .	Nov. 17 . . . . .	4		
Detroit . . . . .	Oct. 13-Nov. 10 . . . . .	27	7	
	Dec. 1-Dec. 29 . . . . .	24	9	
Manchester Township . . . . .	Oct. 20 . . . . .	1		Small-pox reported.
Marquette . . . . .	Dec. 10 . . . . .	1		
Norvill Township . . . . .	Oct. 13-Oct. 20 . . . . .	1		Small-pox reported.
Rives Township . . . . .	Oct. 13-Oct. 20 . . . . .	1		
Royal Oak Township . . . . .	Nov. 1 . . . . .	10	3	
Sebewa Township . . . . .	Nov. 14 . . . . .	12	1	
St. Johns Township . . . . .	Oct. 28 . . . . .	12	3	
Watersmeet Township . . . . .	Dec. 7 . . . . .	4		
<i>Minnesota:</i>				
Brainerd . . . . .	Nov. 15 . . . . .	1		
<i>New Jersey:</i>				
Newark . . . . .	Oct. 6-Oct. 20 . . . . .	6		
Paterson . . . . .	Dec. 10 . . . . .	2		
<i>New York:</i>				
Brooklyn . . . . .	Oct. 6-Nov. 17 . . . . .	4	1	
	Nov. 24-Dec. 8 . . . . .	3		
	Dec. 22-Dec. 29 . . . . .	1	1	
New York . . . . .	Oct. 27-Nov. 24 . . . . .	32	10	
	Nov. 24-Dec. 22 . . . . .	32	4	
<i>Ohio:</i>				
Cincinnati . . . . .	Nov. 23 . . . . .	1		
Deerfield . . . . .	Nov. 5-Dec. 1 . . . . .	4		
<i>Pennsylvania:</i>				
Philadelphia . . . . .	Oct. 22-Nov. 27 . . . . .	34	3	
	Nov. 24-Dec. 1 . . . . .	7	1	
Ridley Park . . . . .	Nov. 17 . . . . .	1		
<i>Vermont:</i>				
Poufret . . . . .	Oct. 20-Nov. 14 . . . . .	2		
Washington . . . . .	Dec. 15-Dec. 25 . . . . .	2		
<i>Virginia:</i>				
Nomini . . . . .	Dec. 27 . . . . .	5		
<i>Wisconsin:</i>				
Beaver Dam . . . . .	Nov. 5-Nov. 26 . . . . .	1	1	
Franklin . . . . .	Oct. 22-Nov. 19 . . . . .	17	3	
Ellsworth . . . . .	Oct. 8-Oct. 22 . . . . .	1	1	
Fond du Lac . . . . .	Dec. 10-Dec. 17 . . . . .	1		
Greenfield . . . . .	Nov. 19 . . . . .	24		
Liberty . . . . .	Oct. 8-Oct. 22 . . . . .	1	1	
Milwaukee . . . . .	Oct. 6-Dec. 10 . . . . .	381	122	
	Dec. 10-Dec. 24 . . . . .	45	20	
Milwaukee Township . . . . .	Oct. 8-Nov. 19 . . . . .	7	1	
Muskego . . . . .	Oct. 22-Nov. 19 . . . . .	7	3	
Raymond . . . . .	Nov. 27-Dec. 3 . . . . .	1		
Rhineland . . . . .	Dec. 3-Dec. 24 . . . . .	2	1	
Rochester . . . . .	Dec. 3-Dec. 24 . . . . .	1		
Spring Prairie . . . . .	Oct. 22-Nov. 19 . . . . .	4	1	
Two Rivers . . . . .	Oct. 22-Dec. 10 . . . . .	14	4	
Wauwatosa . . . . .	Oct. 8-Nov. 19 . . . . .	18	3	
	Dec. 10-Dec. 24 . . . . .	3		
Wonewec . . . . .	Oct. 8-Oct. 22 . . . . .	6		

*Yellow Fever.*—The year 1894 has not shown unusual development of yellow fever outside of its normal zone. The United States has escaped entirely any recrudescence of the late epidemic in Georgia, reported in the previous ANNUAL. In Brazil, the city of Rio de Janeiro; in Cuba, the cities of Havana, Cardenas,

Matanzas, and Santiago de Cuba report several hundred cases, Havana leading with 832 cases and 316 deaths. Puerto Rico, W. I., and San Salvador also report 184 and 167 cases, respectively, the latter with a mortality above 50 per cent.

The following table shows its distribution as reported to the Supervising Surgeon-General U. S. M. H. S. during the year:—

PLACES.	DATE.	CASES.	DEATHS.	REMARKS.
<i>Brazil:</i>				
Rio de Janeiro . . . . .	Apr. 29-Sept. . . . .	452	1	
Santos . . . . .	Oct. 13-Oct. 20 . . . .	2		
	Oct. 6-Oct. 13 . . . .			
<i>Cuba:</i>				
Cardenas . . . . .	July 1-Sept. 15 . . . .	158	28	
Cienfuegos . . . . .	Apr. 29-Oct. 29 . . . .	40	58	
Cruces City . . . . .	Aug. 1 . . . . .	12	11	Fever reported.
Guantanamo . . . . .	June 1-Aug. 31 . . . .	832	316	
Havana . . . . .	Apr. 27-Nov. 22 . . . .	49	19	
	Nov. 22-Dec. 27 . . . .	4	2	
Manzanillo . . . . .	July 1-Aug. 31 . . . .	100	26	Yellow fever reported.
Manzaragna . . . . .	Aug. 1 . . . . .	5	2	
Matanzas . . . . .	June 20-Oct. 17 . . . .	102	29	
	Nov. 1-Nov. 7 . . . .	11	5	
Sagua la Grande . . . . .	July 1-July 7 . . . .			
Santiago de Cuba . . . . .	Apr. 26-Oct. 27 . . . .			
	Oct. 28-Nov. 10 . . . .			
<i>Equador:</i>				
Guayaquil . . . . .	May 4-May 10 . . . .		3	
<i>Honduras:</i>				
Nacaome . . . . .	Apr. 8-Apr. 28 . . . .		5	
<i>Mexico:</i>				
Laguna . . . . .	Sept. 13 . . . . .			Yellow fever reported.
Vera Cruz . . . . .	Apr. 27-Oct. 18 . . . .	197	2	
	Nov. 1-Nov. 8 . . . .		1	
	Nov. 15-Nov. 22 . . . .			
<i>Nicaragua:</i>				
Granada . . . . .	Sept. 14 . . . . .			} Yellow fever reported to be epidemic.
Managua . . . . .	Sept. 14 . . . . .			
<i>Panama:</i>				
Panama . . . . .	Sept. 13 . . . . .	1		Yellow fever reported. (Infection at Guayaquil.)
<i>Salvador:</i>				
La Libertad . . . . .	Aug. 3 . . . . .			Yellow fever reported.
San Salvador . . . . .	July 14-Dec. 31 . . . .		215	
<i>West Indies:</i>				
Antigua . . . . .	Apr. 29-May 5 . . . .	1	1	
Puerto Rico (San Juan) . . . .	June 4-Sept. 6 . . . .	184	29	Confined to barracks. Fever not among shipping.
	Nov. 1-Nov. 14 . . . .		2	
Trinidad (Port of Spain) . . . .	July . . . . .		1	
<i>Yucatan:</i>				
Merida . . . . .	May 25-May 31 . . . .		1	
<i>Venezuela:</i>				
Betizogue . . . . .	Nov. 6 . . . . .			Yellow fever reported.
Maracaibo . . . . .	Sept. 15-Sept. 29 . . . .	7	1	
	Nov. 17-Nov. 24 . . . .	1	1	

*Prevention of the Spread of Yellow Fever.*—In a paper read before the American Public Health Association, Montreal, September 22, 25, 1894, the Surgeon-General of the Marine-Hos-

pital Service notes an increased death-rate and its causes, viz., acute cerebral, gastro-enteric, and malarial affections, as warnings of a yellow-fever outbreak. In seasons of danger he recommends careful diagnosis as a means of guarding against the unnoted approach of yellow fever. Determination of doubtful cases should not be left to local physicians, whose opinions may be influenced by local considerations. An expert independent of the community should be sent to obtain and transmit information. When the epidemic is an actuality he recommends prompt official declaration, house-to-house inspection, disinfection, depopulation of infected areas, and the establishment of military cordons and of detention camps.

*Chinese Plague.*—According to a recent authority<sup>235</sup> the plague was probably imported into Canton in 1894 by way of Thibet, from Northern India. From Canton it was readily conveyed to Hong Kong by persons who removed from one city to another while actually suffering from the disease or during the process of incubation. The steamer's journey between the two places occupies only about eight hours. During the height of the epidemic it was almost a daily event for deaths to occur *en route*.

In considering the causation of the disease, account must be taken of the prevalence of unsanitary conditions in Chinese towns. A prolonged period of drought preceded the outbreak. The rainfall in South China during the winter is small, but during the month preceding the outbreak it was exceptionally so. This absence of rain caused an impure water-supply and a more than usually unsanitary condition of houses and drains. The temperature was also abnormally low, and, consequently, favorable to the development of the disease. All the fostering conditions for an epidemic were, therefore, present.

In Yunnan pigs, goats, rats, and other animals died in great numbers before the disease attacked human subjects. In Canton rats were the only animals observed to be affected. They would come out of their holes in broad daylight, tumble about the streets in a dazed and aimless manner, and die. One official offered ten cash for every dead rat brought him. He received 35,252 in one month. In one day 2000 were brought in.

No absolutely-reliable estimate can be reached as to the mortality, but the total number of deaths was probably 40,000.



One report gives the number of coffins passing through one of the city gates in one day as 170. Another gives 1000 coffins carried out by one gate in forty days. Although all classes suffered, certain conditions of life appeared to confer immunity. The greater number of persons attacked were women and children, especially female children, or those living mostly in-doors. Persons living upstairs were less liable to the disease than those living on the ground-floor. The boating population, who live and sleep on the water, enjoyed almost complete immunity. In the foreign quarter of Canton, the population of which is about 300,—Europeans and Americans,—not a single case occurred among human subjects or animals.

COMPARATIVE MORTALITY TABLE OF CERTAIN CITIES OF THE UNITED STATES  
FOR THE YEAR ENDING DECEMBER 31, 1894.  
(As reported to the United States Marine-Hospital Bureau.)

CITIES.	TOTAL DEATHS FROM ALL CAUSES.	POPULATION, UNITED STATES CENSUS OF 1890.	ANNUAL RATE PER 1,000 OF THE POPU- LATION FOR 1890.	ESTIMATED POPULA- TION.	ANNUAL RATE PER 1,000 OF THE ESTI- MATED POPULATION.
Austin, Tex.....	202	14,575	13.10	(*)	
Baltimore, Md.....	<i>a</i> 9,486	434,439	21.83	496,315	19.11
Batavia, N. Y.....	107	7,221	14.81	9,000	11.88
Bath, Me.....	153	8,723	17.53	9,000	17.00
Battle Creek, Mich.....	159	13,197	12.04	16,000	9.93
Belleville, Ill.....	209	15,307	13.60	20,000	10.45
Bennington, Vt.....	67	6,391	10.48	(*)	
Binghamton, N. Y.....	643	35,005	18.37	40,622	15.82
Blackstone, Mass.....	138	6,138	22.48	(*)	
Bloomington, Ill.....	335	20,484	16.35	25,000	13.40
Boston, Mass.....	11,520	448,477	25.68	501,107	22.98
Bridgeport, Conn.....	900	48,866	18.41	58,243	15.44
Bradford, Pa.....	123	10,114	11.69	(*)	
Bristol, Conn.....	130	7,302	17.80	8,000	16.25
Bristol, Pa.....	136	6,553	20.75	7,000	19.42
Bristol, R. I.....	103	5,478	18.80	6,000	17.10
Brookton, Mass.....	481	27,294	17.62	33,939	14.17
Brookline, Mass.....	234	12,103	19.33	(*)	
Brooklyn, N. Y.....	21,183	806,343	26.27	1,012,000	20.93
Brownsville, Tex.....	266	6,134	4.36	6,000	44.33
Brunswick, Ga.....	<i>b</i> 161	8,459	19.03	8,359	19.26
Burlington, Vt.....	290	14,590	19.18	(*)	
Butler, Pa.....	87	8,734	9.96	9,500	9.15
Butte, Mont.....	442	10,723	41.21	30,000	14.73
Cambridge, Mass.....	1,527	70,023	21.80	79,607	19.28
Charleston, S. C.....	<i>c</i> 1,779	54,955	32.37	65,165	27.29
Chattanooga, Tenn.....	458	29,100	15.73	40,000	11.45
Cheboygan, Mich.....	145	8,235	22.45	(*)	
Chester, Pa.....	419	20,226	20.71	22,000	19.04
Chicago, Ill.....	23,892	1,099,850	21.72	1,600,000	14.93
Cincinnati, Ohio.....	5,945	296,908	20.02	325,000	18.29
Claremont, N. H.....	102	5,565	18.32	6,000	17.00
Cleveland, Ohio.....	5,663	261,353	21.28	325,000	17.42
College Point, N. Y.....	95	6,127	15.50	(*)	
Columbus, Ind.....	97	6,719	14.43	10,180	9.52
Columbus, Ohio.....	1,309	88,150	14.84	100,000	13.09
Conshohocken, Pa.....	68	5,470	12.43	(*)	
Cortlandt, N. Y.....	99	8,590	11.52	(*)	
Council Bluffs, Iowa.....	289	21,474	13.45	30,000	9.63
Crawfordsville, Ind.....	83	6,089	13.63	7,000	11.85
Cumberland, Md.....	256	12,729	20.11	15,000	17.06
Danville, Ill.....	257	11,491	22.36	20,000	12.85
Dayton, Ohio.....	1,126	61,220	18.39	85,000	13.24

\* Not reported.

*a* White, 7,242; colored, 2,244.

*b* White, 59; colored, 102.

*c* White, 479; colored, 1,300. Population, white, 23,870; colored, 36,295. Rate, white, 16.58; colored, 35.80.

COMPARATIVE MORTALITY TABLE.—Continued.

CITIES.	TOTAL DEATHS FROM ALL CAUSES.	POPULATION, UNITED STATES CENSUS OF 1890.	ANNUAL RATE PER 1000 OF THE POPU- LATION FOR 1890.	ESTIMATED POPULA- TION.	ANNUAL RATE PER 1000 OF ESTI- MATED POPULATION.
Dedham, Mass.....	133	7,123	18.67	75,000	17.73
Detroit, Mich.....	3,934	205,576	19.10	275,000	14.30
Dubuque, Iowa.....	423	30,311	13.95	40,000	10.67
Daukirik, N. Y.....	196	9,416	20.31	10,000	19.60
East St. Louis, Ill.....	278	15,169	18.33	25,000	11.12
Elizabeth, N. J.....	842	37,764	22.29	41,000	20.53
Enfield, Conn.....	121	7,199	16.80	7,199	16.80
Erie, Pa.....	823	40,634	20.25	50,000	16.46
Evansville, Ind.....	927	50,756	18.26	60,000	15.45
Everett, Mass.....	280	11,068	25.29	(*)	
Fitchburg, Mass.....	341	22,037	15.47	29,383	11.60
Flint, Mich.....	143	9,503	14.58	10,420	13.72
Fort Smith, Ark.....	139	11,311	12.28	16,000	8.65
Fort Worth, Tex.....	307	23,076	13.30	32,000	9.59
Fresno, Cal.....	130	10,818	12.01	10,000	13.00
Grand Rapids, Mich.....	1,036	60,278	17.18	79,664	13.00
Green Bay, Wis.....	120	9,069	13.23	(*)	
Greenville, Miss.....	143	5,473	26.12	8,200	17.43
Greenwich, Conn.....	182	10,131	17.96	(*)	
Harrisburg, Pa.....	585	39,335	15.08	(*)	
Hartford, Conn.....	951	53,230	17.86	60,000	15.85
Haverhill, Mass.....	505	27,412	18.42	31,390	16.08
Hazleton, Pa.....	170	11,872	14.31	14,000	12.14
Helena, Mont.....	125	13,834	9.03	(*)	
Hoboken, N. J.....	1,197	43,648	27.42	50,000	23.94
Holyoke, Mass.....	777	35,637	21.80	(*)	
Hornellsville, N. Y.....	152	10,996	13.82	12,000	12.50
Houston, Tex.....	687	22,537	22.90	(*)	
Ironton, Ohio.....	183	10,939	16.72	(*)	
Jackson, Miss.....	269	20,795	12.93	(*)	
Jacksonville, Fla.....	165	12,935	12.75	(*)	
Jamestown, N. Y.....	317	16,038	19.76	18,627	17.01
Jersey City, N. J.....	4,354	163,003	26.71	179,939	24.19
Johnstown, N. Y.....	135	7,768	17.37	9,000	15.00
Johnstown, Pa.....	455	21,505	20.82	20,000	17.50
Kalamazoo, Mich.....	205	17,533	14.84	21,000	12.61
Keokuk, Iowa.....	204	14,101	14.46	20,000	10.20
Kingston, N. Y.....	396	21,261	18.62	21,500	18.41
Knoxville, Tenn.....	d 71	22,535	29.77	40,358	16.62
Laredo, Tex.....	454	11,319	40.10	11,350	40.00
Lawrence, Mass.....	975	44,654	21.83	(*)	
Leavenworth, Kans.....	341	19,763	17.25	(*)	
Lebanon, Pa.....	330	14,664	22.50	16,000	20.02
Leominster, Mass.....	135	7,293	18.57	(*)	
Lima, Ohio.....	232	15,981	15.76	(*)	
Little Falls, N. Y.....	91	8,783	10.36	(*)	
Little Rock, Ark.....	649	25,574	25.08	(*)	
Lockport, N. Y.....	222	16,038	13.84	16,088	13.79
Lowell, Mass.....	1,775	77,696	22.84	90,613	19.53
Ludington, Mich.....	103	7,517	13.70	8,300	12.40
Lynchburg, Va.....	e 419	19,709	21.25	24,000	17.45
McKeesport, Pa.....	418	20,741	20.15	25,000	16.21
Macon, Ga.....	451	22,746	19.82	(*)	
Manchester, N. H.....	977	44,126	22.14	50,000	19.54
Manitowoc, Wis.....	105	7,710	13.61	8,500	12.35
Marinette, Wis.....	294	11,523	25.51	14,500	20.27
Marlboro, Mass.....	271	13,505	19.63	15,000	18.06
Massillon, Ohio.....	146	10,092	14.46	12,500	11.68
Medford, Mass.....	190	11,079	15.50	15,000	13.66
Melrose, Mass.....	100	8,519	22.60	(*)	
Memphis, Tenn.....	1,290	64,495	20.01	55,923	23.05
Merriden, Conn.....	411	21,652	18.98	25,500	14.42
Merrill, Wis.....	129	6,809	18.94	(*)	
Michigan City, Ind.....	189	16,776	11.26	(*)	
Middletown, N. Y.....	198	11,977	16.53	11,612	17.05
Middletown, Ohio.....	90	7,681	11.71	10,000	9.00
Milford, Mass.....	178	8,780	20.37	(*)	
Milwaukee, Wis.....	4,248	204,468	20.74	270,000	15.71
Minneapolis, Minn.....	2,069	164,738	12.55	223,700	9.24
Mount Vernon, N. Y.....	285	10,830	23.63	18,000	14.22
Muskegon, Mich.....	256	22,702	12.55	20,226	14.09
Nashua, N. H.....	406	19,311	21.02	25,000	16.24
Naugatuck, Conn.....	140	6,213	22.51	8,320	16.82
Newark, N. J.....	4,614	181,830	25.37	200,000	23.07
New Bedford, Mass.....	1,037	40,733	25.45	(*)	
New Brighton, N. Y.....	325	16,425	19.78	17,261	18.82
Newburyport, Mass.....	246	13,947	17.63	(*)	
New Orleans, La.....	f 6,843	242,039	28.27	275,000	24.88

\* Not reported.

d White, 401; colored, 270. Population, white, 31,273; colored, 9,112. Rate, white, 12.11; colored, 29.63.

e White, 156; colored, 263.

f White, 4,272; colored, 2,571. Population, white, 195,000; colored, 80,000. Rate, white, 21.91; colored, 32.14.

COMPARATIVE MORTALITY TABLE.—*Concluded.*

CITIES.	TOTAL DEATHS FROM ALL CAUSES.	POPULATION, UNITED STATES CENSUS OF 1890.	ANNUAL RATE PER 1000 OF THE POPU- LATION FOR 1890.	ESTIMATED POPULA- TION.	ANNUAL RATE PER 1000 OF THE ESTI- MATED POPULATION.
Newport, R. I.....	379	19,457	19.47	20,000	18.95
New Rochelle, N. Y.....	166	8,217	20.20	10,500	15.80
Newton, Mass.....	417	24,379	17.10	30,278	13.77
New York, N. Y.....	41,175	1,515,301	27.17	1,925,562	21.38
North Attleboro, Mass.....	105	6,727	15.60	7,400	14.18
Northampton, Mass.....	264	14,990	17.61	16,400	16.09
Ogden, Utah.....	177	14,889	11.88	18,000	9.83
Olean, N. Y.....	79	7,338	10.73	8,000	9.87
Omaha, Neb.....	1,149	140,452	8.18	(*)	
Oneonta, N. Y.....	100	6,272	15.94	8,000	12.50
Ottumwa, Iowa.....	206	14,001	14.71	17,000	12.11
Palmer, Mass.....	127	6,520	19.47	(*)	
Passaic, N. J.....	437	13,028	33.54	(*)	
Pensacola, Fla.....	256	11,750	21.78	15,000	17.06
Petersburg, Va.....	579	22,680	25.52	(*)	
Philadelphia, Pa.....	20,837	1,046,964	19.90	1,134,437	18.28
Pittsburgh, Pa.....	4,973	238,617	20.84	(*)	
Plainfield, N. J.....	201	11,267	17.83	12,000	16.75
Plymouth, Pa.....	202	9,344	21.61	(*)	
Port Chester, N. Y.....	142	5,274	26.92	6,500	21.84
Portland, Me.....	807	36,425	22.15	40,000	20.17
Port Richmond, N. Y.....	115	6,290	18.28	(*)	
Pottstown, Pa.....	179	13,285	13.47	16,000	11.18
Tonguekeepsie, N. Y.....	446	22,206	20.08	20,000	17.84
Putnam, Conn.....	105	6,512	16.12	(*)	
Racine, Wis.....	282	21,014	13.41	26,000	10.84
Reading, Pa.....	1,257	58,661	21.42	70,000	17.95
Richmond, Va.....	1,720	81,388	21.13	85,000	20.23
Rochester, N. Y.....	2,181	133,896	16.28	150,000	14.54
Rutland, Vt.....	175	11,760	14.88	(*)	
St. Johnsbury, Vt.....	100	6,567	15.22	(*)	
St. Louis, Mo.....	8,710	451,770	19.27	540,000	16.12
Salt Lake City, Utah.....	567	44,843	12.64	70,000	8.10
San Diego, Cal.....	202	16,159	12.50	16,153	12.50
San Francisco, Cal.....	6,219	298,997	20.79	330,000	18.84
Santa Barbara, Cal.....	137	5,864	23.36	(*)	
Sault Ste. Marie, Mich.....	74	5,760	12.84	7,185	10.29
Savannah, Ga.....	1,225	43,189	28.36	(*)	
Scranton, Pa.....	1,556	75,215	20.68	90,000	17.28
Seattle, Wash.....	467	42,837	10.90	(*)	
Seneca Falls, N. Y.....	110	6,116	17.98	8,000	13.75
Sing Sing, N. Y.....	179	9,352	19.14	(*)	
Sioux Falls, S. Dak.....	61	10,177	5.99	13,564	4.49
Somerville, N. J.....	873	40,152	21.74	52,600	16.59
Springfield, Mass.....	791	44,179	17.90	50,284	15.73
Spokane, Wash.....	235	19,922	11.79	30,000	7.53
Steeleton, Pa.....	104	9,250	11.24	10,000	10.40
Sterling, Ill.....	80	5,824	13.73	6,745	11.86
Stockton, Cal.....	184	14,424	12.75	17,000	10.82
Superior, Wis.....	208	11,933	17.35	35,000	5.94
Syracuse, N. Y.....	1,558	88,143	17.67	91,944	16.94
Taunton, Mass.....	575	25,448	22.59	26,954	21.33
Tiffin, Ohio.....	178	10,801	16.47	14,000	12.71
Toledo, Ohio.....	1,020	81,434	12.52	120,000	8.50
Urbana, Ohio.....	81	6,510	12.44	8,000	10.12
Utica, N. Y.....	945	44,007	21.47	50,000	18.90
Virginia City, Nev.....	95	8,511	11.16	(*)	
Wallingford, Conn.....	109	6,584	16.55	8,000	13.62
Waltham, Mass.....	298	18,707	15.92	22,000	13.54
Warren, Ohio.....	67	5,973	11.21	8,000	8.57
Washington, D. C.....	5,868	230,392	25.46	295,000	19.89
West Bay City, Mich.....	208	14,655	14.20	14,000	14.28
Westchester, N. Y.....	150	8,028	18.68	10,000	15.08
Westport, Conn.....	52	3,715	13.99	4,000	13.00
Wilmington, Del.....	1,161	61,431	18.89	70,000	16.50
Winfield, Kans.....	58	5,184	11.18	(*)	
Winona, Minn.....	271	18,208	14.88	22,000	12.31
Winston, N. C.....	199	8,018	24.81	(*)	
Woburn, Mass.....	208	13,499	22.07	14,450	20.62
Worcester, Mass.....	1,728	84,655	20.41	100,410	17.20
Yonkers, N. Y.....	736	32,033	22.97	35,000	21.02
Youngstown, Ohio.....	502	33,220	15.11	35,000	14.34
Zanesville, Ohio.....	323	21,009	15.37	21,100	15.30

\* Not reported.

# ANATOMY.

By L. TESTUT, M.D.,

LYONS,

AND

E. VIALLETON, M.D.,

MONTPELLIER.

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## GENERAL CONSIDERATIONS.

R. Havelock Charles <sup>277</sup><sub>Apr., Oct., '94</sub> describes a number of peculiarities in the form of the bones of the leg in the indigenous tribes of the Punjaub, which seem to depend on the fact that they habitually assume a crossed attitude similar to that of tailors, not sitting down as do Europeans. In this way the bones acquire a certain form from the action of certain groups of muscles, this form being transmitted to the descendants. The peculiarities can be observed in the fœtus, and furnish an indubitable proof of the transmission of certain acquired characteristics.

Thomas Dwight <sup>59</sup><sub>Sept. 8, '94</sub> reviews the different methods of obtaining the measurements of the human body by the aid of certain parts of the skeleton. Having commented critically on the work of Topinard, Rollet, and Manœuvrier, he proposes two new methods. The first consists in taking, as the point of departure, the length of the sternum, less the ensiform cartilage; this, however, gives rise to such variations as to prevent its being taken into serious consideration. The second method consists in measuring, in a straight line, the vertebral column, from the atlas to the promontory, omitting the sacrum and the coccyx, the length of which is too variable. The researches of the author were made upon a large number of subjects of both sexes, with severe control of all contested points. They are therefore worthy of the consideration of medical experts, who will derive considerable profit from a perusal of his work. Michaut <sup>749</sup><sub>Apr., '94</sub> calls attention to the wonderful facility with which the Japanese use their feet as prehensile organs. The Japanese acrobat, lying upon his back,



accomplishes wonders with his feet, using enormous balls or bamboo rods. Others write the most complicated Chinese characters by holding the brush with the great toe, and a great many public writers use the foot as easily as they do the hand. Workmen use their feet with great facility in handling or holding pieces of wood. If the sailors find their hands are encumbered, they seize the cords with their feet. The foot of the Japanese, not confined in straight shoes, as is the case with us, is a true "*pied de polichinelle*" (Punch-like), possessing extraordinary motility, capable of torsion and forced extension. The metatarsi roll upon one another, the first being separated from the others by an interval of sometimes as much as twenty millimetres, and the inner surface of the great toe can be made to touch that of the two neighboring toes. It is a true prehensile organ, and though there may not be true movements of opposition, movements of torsion can be observed in the child.

The author also remarks on the separation, in the Annamites, of the great toe from its neighbors. This separation, common to all Annamites, is more pronounced in certain tribes than in others, and in some families becomes a real deformity. The angle formed by the axis of the great toe and the general axis of the foot reaches fifty-five degrees and the space between the great toe and its neighbor as much as four and one-half centimetres. Traces of this singular anatomical disposition are to be found in history, the kingdom of Giao-Chi, or Van-Lang, being called, according to the Chinese translation, "the people of bifurcated toes." This ancient people, an historical *résumé* of whom has been given by Dumise, <sup>823</sup> Nov., Dec., '90 presents the maximum ethnographical peculiarity of separation of the great toe.

Regnault <sup>927</sup> Mar. 3, '94 compares the fingers of the human hand with those of the monkey. In man the first and second are curved toward the third, while the third and fourth curve toward the second. In the monkey, on the contrary, including the anthropomorphous apes, the fingers are straight. The cause of this difference is due, according to the author, to the method of opposing the thumb. When man wishes to take hold of an object, he can oppose the thumb to any of the four fingers, the natural movement of opposition leading the thumb between the second and third fingers. If it is desired to oppose it against the third or

fourth fingers, the thumb must be directed toward the external border of the hand; if to the first finger, it must be directed toward the second. The ape, as is known, has but one movement of opposition, altogether rudimentary: he takes hold of objects, either between the four flexed fingers and the palm of the hand, or, if he desire greater precision, between the index and the pulp of the thumb applied against the radial border of the first phalanx of the second finger. Hence, the absence of the curvatures of the four fingers seen in man. Regnault,<sup>927</sup><sub>Apr. 21, '94</sub> in a research upon the direction of the great toe according to the functions of the foot, formulates the following conclusions: 1. Persons who continually use the foot to hold objects between the first and second toes have the great toe projected inward, in relation to the axis of the body of the foot. 2. Straight shoes, on the contrary, throw out the great toe. 3. In the barefooted who have used their feet only for walking, anthropologists and physicians have thus far admitted the parallelism between the large toe and the internal edge of the foot.

Meyer, who first advanced this opinion, even recommended a uniform shoe, with a square extremity and a straight internal border. However, from numerous examinations of the feet of those who have never worn shoes, it appears that there is a slight abduction of the large toe. Of 36 Dahomians, in 16 the great toe turned inward, 14 times outward, and in 6 it was parallel. Several barefooted children at Kihe also showed this slight abduction. From numerous photographs in the possession of the French Geographical Society, showing its frequency in peoples who have never used the foot for prehensile purposes and who go barefooted, the author concludes that the so-called rational shoe, with straight inner border, is in reality defective. Golebienski,<sup>41</sup><sub>July 5, '94</sub> states that extension of the foot occurs actively by the action of the muscles and passively by the weight of the body. When too great weight is imposed upon the foot, it shortens visibly from muscular effort and ruptures may occur.

Hutchinson<sup>806</sup><sub>Apr., '94</sub> regards the hair appearing upon the chest, back, and hips as sexual characteristics, since it does not appear before puberty. It does not seem to him improbable that there is a law of local competition restraining the growth of hair, its suppression on the face, body, and limbs of women leading to its

luxuriant growth on the head. Men with a heavy beard are often bald. Such a law is supported by the fact that hair requires for its growth nourishment which is not provided in an unlimited quantity.

Sébileau<sup>55</sup><sub>Jan. 13, '94</sub> rejects the terms crural canal, vasculo-femoral canal, and crural infundibulum as not expressing the same meaning for all anatomists. Their introduction into anatomical descriptions is not warranted by the results of dissection. He freely admits the existence of a crural ring in which the arteries, veins, and lymphatics become engaged, but denies the presence of a vertical septum separating these elements. Although a very small amount of cellular tissue separates the artery from the vein and the vein from the lymphatic, this is all one, and a further division has no more reason to exist here than elsewhere; besides, when the ring has been passed, the vascular bundle enters into the superior territory of the femoral sheath, where, as in the ring, artery, vein, and lymphatic take their course together between the musculo-aponeurotic spaces, as a river in its bed, and no true septum divides the mass, there being no difference between this and all the other vasculo-lymphatic bundles.

Bergonzoli<sup>13</sup><sub>Sept. 16, '94</sub> calls the attention of anatomists to the antiseptic properties of formalin, or formol. Solutions of this substance, used as a conservative bath or injected into the vessels, act as disinfectants and remove all unpleasant odor. The specimens (viscera, muscles, or nervous centres) when immersed in it become rapidly fixed and hardened, retain almost a normal color, and show little shrinking. Formol has also the advantage over alcohol of not being inflammable and of being much less expensive.

#### BONES.

Zander<sup>316</sup><sub>v. 9</sub> has studied the relations of the trigeminus and its ganglion with the petrous bone in one hundred skulls and twelve heads, and describes four elements observed upon the petrous bone: 1. A furrow in the upper edge, giving passage to the trigeminal nerve. 2. A groove upon the anterior surface, running obliquely from above downward and from within outward, in which rests the triangular plexus of the left branch of the trigeminus; this is the impression of the trigeminal. 3. A fossula, more or less wide, responding to the Gasserian ganglion. 4. A

rounded sulcus, situated in the anterior border in rare cases in which the fossula just mentioned is not distinct.

Kalenscher<sup>2141</sup><sub>94</sub> believes that the third condyle results from ossification of the points of attachment of the suspensory ligament of the odontoid apophysis, while the accessory eminences of the occipital are due to ossification of the points of insertion of the anterior occipito-atlantal ligament. In six hundred skulls examined the author observed these abnormal projections eighty-four times,—a proportion of 14 per cent. Sexual and ethnographical influence could not be determined.

Juvard and Dide<sup>7</sup><sub>No.1,94</sub> report, upon the transverse apophysis of the cervical vertebra, that, besides the anterior and posterior tubercle, mentioned in all classical works, there exists a third tubercle situated below the anterior tubercle which the authors call the median tubercle. Upon it are inserted the tendinous bundles of the anterior scaleni. Hartmann<sup>7</sup><sub>No.1,94</sub> replies that this fact has been taught by all prosectors of the Faculty of Paris who were formerly pupils of Farabœuf. They have always stated that the scaleni are inserted into the lower portion of the anterior tubercle of the transverse cervical apophyses. Therefore the only new feature contained in the previous communication is the fact that it is desired to give the name of median tubercle to that which has heretofore always been designated as the lower portion of the anterior tubercle.

Macalister<sup>277</sup><sub>Jan.,94</sub> has made a very comprehensive study of the development and anomalies of the second cervical vertebra. The development of the axis comprises eleven stages: development of the arc, of the body, and the apophysis of the odontoid, union of the body with the arc, union of the body with the odontoid apophysis, etc. The development may present anomalies, of which the most interesting are those of the spinous, transverse, and odontoid apophyses.

Kertész<sup>777</sup><sub>No.3,94</sub>; <sup>2</sup><sub>Sept.1</sub> reports a case of cervical rib. The outgrowth was on the left side of the neck and could be felt one inch above the middle of the clavicle as an immovable bony protuberance which could be followed back to the spinal column. It was about half an inch in breadth. The subclavian artery ran above the plexus in front of the rib. On making pressure on the space between the anterior extremity of the rib and the clavicle, sharp



shooting pain was felt radiating down the arm to the elbow. The arteries of the left upper limb were perfectly normal and the movements of the head were not interfered with. Kertész has found records of seventeen cases of cervical rib. In every case the rib was connected with the seventh cervical vertebra. Some of these were complicated with aneurism of the subclavian, with or without obliteration of the arteries supplying the upper limb. In some cases there were neuralgic pains in the forearm and fingers; in some the abnormal ribs were situated on both sides of the neck; in a few cases the rib was movable. In four of the cases the rib was removed on account of its giving rise to some of the symptoms just mentioned. In Kertész's case there were no symptoms calling for operation.

Le Fort <sup>7</sup><sub>No. 7, '94</sub> observed a costal cartilage which formed a continuation of the fourth rib on the left side and which was bifurcated and articulated with the sternum at both branches of the bifurcation. Stanley Boyd <sup>451</sup><sub>Nov., '93</sub> reports the case of a young woman who presented on the left side of the neck a supernumerary rib, which pushed back the subclavian artery, and which, on first sight, gave the impression of a pulsatile tumor.

Alexis Jullien, <sup>55</sup><sub>Aug. 4, '94</sub> in studying the morphological value of the sternum in the vertebrate series, arrives at the following general conclusion: The sternum always co-exists with the shoulder and the lung; without both of the latter there would be no sternum,—in other words, all the vertebrates having a sternum also possess a shoulder and a lung, but the reverse is not always the case. To this general conclusion, which is true of the entire vertebrate species, the author adds several others of secondary importance: 1. The sternum, the ribs, and the shoulder are not always constant, except in mammals and birds. 2. The sternum is always articulated with the ribs and the shoulder in birds, with the ribs in mammals, and with the shoulder in reptiles and in batrachians.

Baxter Tyrie <sup>277</sup><sub>July, '94</sub> reports three cases of congenital partial or total absence of a bone: 1. Absence of the two radii in a foetus born at term and presenting a normal development. The missing bone was replaced by a fibrous cord, and the carpus was articulated with the cubitus. The hand was without a thumb. 2. Absence of the upper third of the left radius in a foetus. 3.

Littlewood communicated to the author the case of a child, 2 years old, who was unable to walk on account of the twisted condition of the left foot, caused by the absence of the two lower thirds of the peroneum.

Löhr<sup>316</sup><sub>No. 17, '94</sub> has again studied the preauricular groove, long since reported as existing in front of the articular surface of the iliac bone. He considers it the result of attachment, at this point of the bone, of the anterior sacro-iliac ligaments. He calls attention to the fact that the skeleton shows analogous grooves at various points; for instance, upon the anatomical neck of the humerus, below the upper articular surface of the tibia, upon the bones of the foot and of the hand. He also cites, as an analogous formation, the deep furrow which surrounds the articular surface of the articular apophyses of the vertebræ, particularly the cervical and lumbar vertebræ. All these grooves, like the preauricular groove of the coccyx, serve for the insertion of the articular capsule. Konikow<sup>5</sup><sub>May, '94</sub> gives numerous measurements from which he concludes that each period of life presents particular forces which act upon the development of the pelvis. From the time of birth up to 5 years the main influence is the internal energy of the growth of the articulations; from 10 to 11 years the pelvis differs but little in both sexes, but, as soon as ovulation and menstruation become established, the female pelvis is easily recognizable. At the age of 19 or 20 the masculine pelvis has a transverse diameter equal to or greater than that of the feminine, but in the latter the diagonal conjugate diameter is considerably larger.

Thilenius,<sup>316</sup><sub>No. 14, '94</sub> in common with the majority of anatomists, considers the sesamoids as forming portions of the true skeleton, being developed at the expense of the nuclei of hyaline cartilage. The opinion which refers their production to mechanical influences is not justifiable, as they originate at a period when the latter are not yet exercised. With regard to the metacarpo-phalangeal sesamoids, in particular, they have been observed in the human embryo by the author, from the middle of the third month, in the form of round or elliptical cartilaginous nodules, situated in the tissue of the articular capsule. Primarily there are two for each metacarpo-phalangeal articulation, one on the radial and one on the cubital side. As is known, they gradually become reduced in number, until in the adult seven form the maximum, and these

cases are even rare. This numerical reduction of the sesamoids during the course of ontogenic development warrants their being considered as rudimentary formations.

#### ARTICULATIONS.

Wilmart, <sup>868</sup><sub>Aug. 11, '94</sub> having studied the interarticular fibro-cartilages, concludes that they may or may not, according as the case may be, serve to establish the reciprocity of the articular surfaces, or act as ligaments, but that they always exert the function of lessening shocks and intra-articular pressure, and, probably, likewise protect the peripheral subcutaneous or nearly subcutaneous ligaments against the unfavorable influence of atmospheric pressure. The same author <sup>868</sup><sub>Sept. 1, '94</sub> with reference to the diarthrodial cartilages, first calls to mind the following classical conclusions: (1) on the plane surfaces the cartilaginous layer is of a thickness equal to the distance from the centre to the periphery of the surfaces; (2) on concave surfaces the covering is thicker around the edges than in the centre; (3) on convex surfaces it is thicker in the middle than around the edges. He then refers to the two remarkable exceptions presented in this connection by the atlanto-axial articular surfaces and the external glenoid cavity of the tibia. The atlanto-axial surfaces, in fact, are plane surfaces in the skeleton, but in the fresh subject are convex from the front backward; in the same manner the external glenoid cavity is, in the fresh subject, convex antero-posteriorly. In order to explain these two exceptions, the author recalls the necessity of close approximation of the parts in the skeletal specimens, in order to execute a rotation movement; now, in order to make this proximity possible, it is necessary either that the lining cartilages be thinner toward the edges than toward the centre of the articulating surfaces, or that the ligaments be longer than is necessary to maintain the articular surfaces in contact centre to centre. The latter condition would not be possible without seriously compromising the solidity of the joint; therefore the former condition is the one which really exists.

Kazzander <sup>29</sup><sub>p. 161, '94</sub> has studied the development of the knee-joint in the sheep. Between the femur, on the one hand, and the tibia and the patella, on the other, there is found at the origin an intermediate zone composed of indifferent materials,—remnants of the formative material of the femur and the tibia. The intermediate

femoro-tibial zone is more premature than the femoro-patellar, the development of the patella from an offshoot, from which the extensor of the leg and the crucial ligament are also derived, occurring later. All the elements of the femoro-tibial articulation, fibro-cartilages, crucial ligaments, capsule, and articular cavity arise from the differentiation of the intermediary zone. The first formations are the fibro-cartilages, then the capsule, and only later the crucial ligaments. These, however, notwithstanding their tardy appearance, histologically speaking, form more rapidly than the fibro-cartilages. The rotula is distinguishable at the same time as the crucial ligaments and, in the beginning, is not cartilaginous. In the intermediary zone, separating it from the femur, the femoro-patellar articular space is seen at a period when the patella has not yet become cartilaginous, and simultaneously with the femoro-tibial space, which grows much more slowly than the former. Together with the development of the femoro-patellar cavity, a modification of the intermediary zone occurs; it is transformed into embryonic connective tissue, which, up to a certain period, covers the articular surfaces and afterward disappears, no doubt from friction of the articular surfaces. The extensor muscle of the leg is still very incompletely recognizable when the articular cavities make their appearance. It is impossible to say whether contractions of the muscle have an influence on this phenomenon.

#### MUSCLES.

Lambert <sup>749</sup><sub>Apr., '94</sub> cites a case of presternal muscle detached above from the tendon of the sterno-cleido-mastoid and partially fused below with the bundles of the pectoralis major. He also rejects the opinion advanced by certain anatomists, that the presternal muscle is found situated between the skin and the superficial thoracic aponeurosis; in this he is correct as to the muscle observed by him, but it is none the less true that certain presternal muscles do actually occupy the situation indicated. Gilis <sup>7</sup><sub>No. 7, '94</sub> also reports two cases of presternal muscles, both abnormal formations being double,—asymmetrical in the one and symmetrical in the other. The author does not present any new hypothesis concerning the anatomical significance of this muscle, and considers that the anomaly in question is of unimportant morphological value.

Littlewood <sup>6</sup><sub>July 7, '94</sub> reports a case of congenital absence of the



two pectoral muscles of the right side and recalls the fact that there exists, in the Museum of the Medical Department of the Yorkshire College, a photograph of an analogous case observed by Barrs. Tersen<sup>577</sup><sub>May, '94</sub> reports two cases of partial absence of the pectoral muscles. In the first the pectoralis major was present in the upper two-thirds, only the lower third being missing. In the second case the pectoralis major was found reduced to the clavicular portion, and the pectoralis minor did not appear to exist. In both cases the anomaly was unilateral and was not present on the left side. The author considers them as congenital, but there is not a sufficient reason for *a priori* rejection of pathological influences, since such influences invade the organism during intra-uterine life and occasionally cause more or less extensive anatomical degenerations, which, later on, may pass for morphological anomalies.

Ledouble<sup>749</sup><sub>p. 628, '93</sub> has made a study of the morphological varieties of the dorsalis major muscle and classes them in four groups: (1) division of the muscle into thin bundles; (2) more intimate connection of the muscle with the teres major; (3) supernumerary or modified insertions into the vertebral column, the ribs, and the coccyx; (4) development of additional bundles, principally a scapular bundle, a bundle elevating the tendon, an axillary bundle (*achselbogen* of Langer), and a dorso-epitrochlear bundle. In each of these groups the author describes numerous varieties, and attempts to explain their occurrence according to the formula of comparative anatomy accepted to-day.

Souligoux<sup>7</sup><sub>No. 3, '94</sub> insists upon certain peculiarities of formation of the internal intercostal aponeurosis. The aponeurotic tracts which form it originate at various points of the intercostal skeletal frame-work. Some extend backward, starting from the sternal border and the anterior extremities of the ribs; others start from the external edge of the lower rib and extend upward divergently; still others leave the internal edge of the upper rib. Under the upper fibrous tracts pass the vessels and nerves, which are almost in contact with the pleura.

Baraduc and Crouzon<sup>7</sup><sub>No. 5, '94</sub> describe an acromio-clavicular muscle analogous to that reported by Gruber in 1865. It is inserted into the summit of the acromion and into several tendinous fibres of the deltoid by a flattened tendon, which is soon

succeeded by muscular fibres attaching themselves to the anterior border of the clavicle, in its middle portion, just above the insertion of the deltoid. The authors have dissected one hundred and forty subjects without having met with a similar muscle. The anomaly would thus appear to be very rare.

Souligoux<sup>7</sup><sub>No. 6, '94</sub> reports a new case of abnormally-short coracobrachial muscle. It existed on both sides, extending on the left from the internal portion of the humerus to the internal border of the coracoid apophysis. On the right it was inserted in the same way, below, on the portion of the internal surface of the humerus comprised between the *dorsalis major* and the lesser tuberosity of the humerus. From here it extended upward and divided into two bundles: one, an internal bundle, which terminated upon an aponeurotic arcade occupying the central third of the internal border of the coracoid apophysis; the other, an external bundle, which terminated partially upon the summit of the coracoid apophysis and partially upon the humeral capsule.

Mauclaire<sup>7</sup><sub>No. 2, '94</sub> observed, upon a subject in the dissecting-room of the Faculty of Paris, a small supernumerary muscular bundle, which was detached from the mass of the epitrochlear muscles below the superficial level of the *flexor sublimis*. This fleshy bundle, three or four centimetres long, became a tendon extending for about four centimetres, and afterward gave rise to a flattened muscular body, bifurcated lower down, and finally extending to the index and little finger. In the upper portion, just beside of fleshy fibres of the upper belly of this digastric muscle, a second supernumerary bundle, one centimetre in thickness and five or six centimetres in length, was found, which, through a small insertion cord, was lost in the true *flexor* muscle of the thumb. Finally, in the same subject, an arteriole, a branch of the cubital, crossed, from behind forward, the trunk of the median nerve and divided it at a height of about one centimetre. Apropos of this last anomaly, the author reports several personally-observed cases of separation of certain nerve-trunks (median, sciatic) by arterial branches, or, inversely, division of certain arterial trunks by nerves.

Keith<sup>271</sup><sub>Apr., '94</sub> has studied the arrangement of the deep flexors of the fingers and toes in primates. In the hand, the deep flexor is composed of radial and cubital muscular bundles; in the foot, of

bundles, some originating in the peroneum and others in the tibia. The extent to which these bundles participate in the formation of the tendons of the toes is variable. In the hand the muscular fibres extending from the radius and the cubitus may also contribute to the formation of the five tendons of the flexor profundus. In a second variety the tendon of the thumb may spring from the radial fibres, and the cubital fibres may give rise to the other four tendons. Finally, the cubital fibres may entirely supersede the radial in forming the tendon of the thumb. In the inferior member the tendons of the first, second, and fifth toes originate from the tibial fibres associated with the peroneal fibres, which latter give rise to the tendons of the third and fourth toes; in a second variety, the peroneal fibres form the tendons of the first, third, and fourth toes, and the tibial fibres those of the second and fifth. Finally, the tibial fibres may only constitute the tendon of the fifth toe and send forth an expansion to that of the second. Six explanatory plates accompany the description of the author, whose researches were made upon a certain number of cynomorphs, gorillas, chimpanzees, ourangs, and gibbons.

W. Browning,<sup>96</sup><sub>Feb., '94</sub> basing his statements upon the arrangement of the psoas-iliac muscle and of the upper extremity of the femur, demonstrates that, if this muscle contract when the thigh is in extension, it imparts an internal rotation to the inferior member. On the contrary, if the contraction occur when the member is in a state of semi-flexion the psoas-iliac produces an external rotation. Tyrie,<sup>1</sup><sub>Sept. 1, '94</sub> describes, under the name of saphenous muscle, an abnormal muscular bundle which he found in the region of the inguinal canal below the femoral aponeurosis. Tendinous at both its extremities and fleshy in the middle, it originates from the antero-superior spinous process of the ilium, together with the femoral arch. From here it extends obliquely inward and downward, first following the inner border of the sartorius; crosses, passing over them, the psoas-iliac, the crural nerve, and the femoral artery; ascends along the course of the sartorius and of the first adductor, and finally terminates upon the internal portion of the femoral arch. The author considers this muscular bundle as a part of the external oblique abdominal muscle.

Parsons,<sup>277</sup><sub>July, '94</sub> endeavors to show that it is possible to find in man the tendo Achillis arranged in three separate tendons, in the

same manner as in certain mammals, particularly the castor, of Canada. In examining, with great care, in the foetus, the muscles entering into the composition of the tendo Achillis, the fibres of the internal trigeninus are seen to descend obliquely outward and join the external portion of the tendon. As to the fibres of the soleus, they follow the internal border of the tendon and continue with the short flexor of the toes in the sole of the foot. The author endeavors to explain this arrangement either by the rotation to which the members are subjected during foetal life or by the forced position in adduction of the feet. He likewise concludes that the plantar is homologous with the great palmar, and that the soleus united with the flexor brevis digitorum pedis is homologous with the flexor sublimis digitorum.

Picou and Delanglade<sup>7</sup><sub>No. 5, '94</sub> have examined in 24 feet (17 of men, 5 of women, and 2 of a child of 20 months) the inferior insertion of the peroneus longus lateralis. In 21 cases they saw, detached from the above-named tendon, an expansion for the first cuneiform. In 20 the anterior border of the tendon sent forth a very thin tendinous prolongation which traversed obliquely the first interosseous space and attached itself to the external surface of the first metatarsal, several millimetres behind the head of this bone. In 7 cases a fibrous band,—a portion of the tendon of the posterior tibial muscle,—after passing below the cuneal expansion, became fused with the terminal portion of the tendon of the peroneus longus lateralis. Picou<sup>7</sup><sub>No. 7, '94</sub> made thirty new dissections of the peroneus longus lateralis (18 men and 12 women) and states that the sesamoid enlargement of this tendon sends forth a fibrous expansion to the posterior extremity of the fifth metatarsal bone and the short flexor muscle proper to the fifth toe; this expansion is generally rather thick, flattened from the top to the bottom, and presenting a width of several millimetres and a length of one centimetre; it may be regarded as a sort of anterior band destined to fix the sesamoid. The author found this twenty-four times in the thirty feet examined. It may therefore be considered as normal. The author has also seen the sesamoid send off in five cases, by its posterior border, a thin expansion which loses itself in the bundles of the inferior calcaneocuboid ligament. Finally, in four cases, he found the principal tendon of the muscle give rise to a thin expansion several milli-



metres above the subcuboid sesamoid, and consequently before its reflexion to the sole of the foot; this expansion in two of the cases became fused with the tendon of the short lateral peroneus, and in the other two inserted itself into the dorsal surface of the base of the fourth metatarsal bone. These thirty new dissections confirm the observations made in work done with Delanglade.

Juvara<sup>7</sup><sub>No.3,'94</sub> describes two small muscular bundles which became detached from the right side of the œsophagus, extended between the two layers of the triangular ligament of the right lung, and terminated on the upper surface of the diaphragm. With reference to this communication, Cornil<sup>7</sup><sub>No.3,'94</sub> justly remarks that former authors—Henle, in particular—have reported analogous muscular bundles.

#### HEART AND CIRCULATION.

Haynes,<sup>1</sup><sub>Dec.9,'93</sub> basing his opinions both upon facts formerly published and upon his own personal researches, establishes, as follows, the relation of the heart and lungs with the anterior wall of the thorax: 1. *Base of the heart*: A line crossing the sternum obliquely from the upper margin of the third right to the lower border of the second left costal cartilage, an inch and a half from the median line of each side. 2. *Apex of the heart*: In the fifth space, near the upper margin of the sixth costal cartilage, two inches and a half to the left of the median line. 3. *Right border*: From the right end of the base, curved slightly outward to reach a point an inch and three-fourths from the right of the middle line over the fourth cartilage, and ends at the centre of the fifth cartilage, an inch from the mid-sternal line. 4. *Left border*: From the left end of the base, with a convexity outward to the apex. It reaches its greatest distance (three inches) from the sternal centre over the fourth space. 5. *Lower border*: A line curved downward at its beginning (at the lower extremity of the right border) and ending at the apex, and slightly convex upward in its centre as it crosses the middle of the ensiform. 6. *Heart dullness*: A quadrilateral area to the left of the median line and below the upper border of the fifth cartilage, nearly two inches in vertical and an inch and a half in extreme lateral measurement. 7. *Auricle, right*: "Ear-shaped," facing to the left, covering the first inch of the third right space and cartilage with the portion of

the sternum adjacent to the latter. Its long axis measures about two inches and is inclined from above downward and outward.

8. *Auricle, left*: A small, oval space, half an inch by an inch, its centre an inch and one-fourth to the left of the median line behind the second left space and third cartilage. Its long axis is directed from above downward and outward.

9. *Auriculo-ventricular groove*: Indicated by a line from the right to the left heart-border, beginning on a level with the upper margin of the fourth right and ending on a level with the lower edge of the third left cartilage. This line is convex upward and crosses the middle of the sternum on a level with the lower border of the third cartilage.

10. *Aorta*: A little more than an inch wide and about two inches long. Extends from the upper border of the third to behind the middle of the first cartilage. At its beginning and ending its centre is behind the median line, but in the middle of its course the artery is convex toward the right.

11. *Pulmonary artery*: About an inch and one-fourth wide and an inch and one-half long. Begins on a level with the lower border of the third and ends behind the middle of the second left cartilage. Below, its centre is one-half inch, and, above, three-fourths inch, to the left of the median line.

12. *Coronary arteries*: Both are nearly vertical; they incline slightly toward the median line at their lower ends. Right, an inch from the mid-sternal line; extends from the upper border of the fourth to the lower border of the sixth cartilage. Left, an inch and three-eighths from the middle line in expansion and three-fourths inch in contraction of the heart; extends from the middle of the third to the lower border of the sixth cartilage.

13. *Anterior margin of the lungs in inspiration*: The right lies to the left of the median line, one-fourth inch from and parallel with it from the upper margin of the second to that of the sixth cartilage (sternal ends). The left is in contact with the right from the upper border of the second to the mid-point between the fourth cartilage, where it turns downward and outward along the upper margin of the fifth left cartilage. Length of contact, two and one-half inches.

14. *Centres of the sternal ends of the costal cartilage*: Opposite the distances on the mid-sternal line, measured from the suprasternal notch.

15. *Nipples*: Over the lower margin of the fourth rib, four inches from the middle line.

Baker, <sup>199</sup><sub>Jan., '94</sub> at an autopsy, met with a bone in the heart, of

which he gives the description and illustration. It was flat and of the shape of a long triangle, of which the base is very irregular and, to a degree, dentated. Probyn Williams<sup>1</sup><sub>Sept. 1, '94</sub> saw a heart which, in addition to a total absence of any intra-auricular partition, presented the following peculiarities: The rudimentary pulmonary artery was closed at its cardiac extremity; on the left side there was a pulmonary vein opening into the superior vena cava. One single vessel, the superior vena cava, greatly enlarged, opened into the auricle.

Tinet<sup>7</sup><sub>No. 11, '94</sub> reports the history of a patient presenting symptoms of bronchitis and apoplexy and indications of pulmonary tuberculosis. At the autopsy it was found that there was perforation of the intra-auricular septum, the aorta, lying across it, receiving the blood from the two ventricles. The opening of the infundibulum of the pulmonary artery was extremely contracted; finally, there existed a left superior vena cava, which emptied into the right auricle after having twined around the posterior wall of the left auricle.

Ryland Whitaker<sup>36</sup><sub>May, '94</sub> proposes the following description of the relation between the axillary artery and the brachial plexus as more in accordance with the reality than that habitually employed: The branches of the brachial plexus are situated outside of the first partition of the axillary artery; the internal branch of the plexus passes behind the middle portion of the vessel in order to reach its inner side in such a way that the artery finds itself in relation with the external branch outside, with the posterior branch behind, and with the internal branch inside." Savariaud<sup>7</sup><sub>No. 1, '94</sub> has seen a collateral artery half the size of the radial artery, detached from the latter, seven centimetres above the pisiform bone. It then extended from above downward, and again joined the radial artery immediately above the origin of the radio-palmar. Charles<sup>277</sup><sub>July, '94</sub> observed in the dissecting-rooms of Queen's College, in Cork, an absence of the radial artery in an aged subject, the artery being replaced by the anterior interosseous. Baxter Tyrie<sup>277</sup><sub>Apr., '94</sub> reports a case in which the arch of the aorta and the descending aorta were uniformly dilated above the celiac trunk; from there on the calibre of the aorta was restricted in such a manner as to equal the diameter of the subclavicular, the vessel continuing its course with this dimension until it bifurcated into two common

iliac arteries, at the level of the fourth lumbar. The right common iliac was situated in front of the left, which fact, in conjunction with several other peculiarities, led to the supposition that the aorta had been subjected to a rotation upon its axis, from right to left, of about ninety degrees. The cœliac trunk, two inches long, gave origin to the hepatic and the coronary arteries, the splenic originated in an independent manner below the cœliac trunk. The superior mesenteric sprang from the left face of the aorta; the right subrenal was inserted into the aorta forward and to the left, the left subrenal backward to the left. There were six renal arteries on the left side, of which three originated in the posterior surface of the aorta, one in the left colic, and one in the left common iliac. The right kidney received three arteries, two coming from the anterior border of the artery and one from the right hepatic artery. The lower mesenteric originated on the left border of the aorta.

Morestin<sup>7</sup><sub>No. 12, '94</sub> observed upon the same subject, both on the right and left sides, two renal arteries and two renal veins. On the left side the two veins were placed between the two arteries; on the right, the contrary was the case. In the same subject the left inferior thyroid artery was detached from the arch of the aorta between the common carotid and the left subclavicular.

Souligoux<sup>7</sup><sub>No. 12, '94</sub> injected the vessels of the internal genital organs of a woman who had died of uræmia, and found that the utero-ovarian arteries were of very small calibre compared with the uterine arteries. On the contrary, the venous plaques were very numerous and voluminous in the region of the ovarian artery. The author has previously observed analogous cases, which go to disprove the statement that the ovarian artery is superior or, at least, equal in volume to the uterine artery.

Wilmart<sup>868</sup><sub>Sept. 1, '94</sub> has studied the reciprocal relations between the arteries and the satellite veins when but one of the latter exists for each artery, as in the case of the brachio-cephalic trunk, the common carotid and the internal carotid, the subclavicular, the axillary, the common iliac, the internal and the external iliac, the femoral, the popliteal, the renal, the gastric, the splenic, the gastro-epiploic, the superior and inferior mesenteric, the colic, the facial, the vertebral, and the intercostal. The author considers himself justified in establishing the following conclusions: 1. The



unisatellite rectilinear vessels, which have vein and artery the same, or very nearly the same, extreme points, are so related that the vein is more superficial than the artery. 2. The unisatellite curvilinear vessels, having vein and artery very nearly the same extreme points, are related so that the vein is always inserted in the curve of the artery. 3. The principle of the shortest line predominates in the course and relation of the veins.

Testut <sup>7</sup><sub>No. 12, '94</sub> studies, under the name of cuneo-limbic vein, a cortical affluent of the veins of Galen, of which the name clearly indicates the situation and origin. This vein, sometimes very voluminous, comes from the internal surface of the hemisphere, where it originates upon the circumvolution of the corpus callosum, generally in the central portion. It usually takes a backward course, parallel to the circumvolution of the corpus callosum, reaches the extremity, winds around the latter in a downward course, and finally empties itself into the common trunk of the veins of Galen, meeting the latter sometimes upon its upper and sometimes upon its lateral surface. During its course the cuneo-limbic vein receives as affluents: (1) superior venules, vertical or oblique in direction, which come from the circumvolution of the corpus callosum (upper portion) and from its marginal fissure; (2) inferior venules, coming from the circumvolution of the corpus callosum (lower portion) and from the corpus callosum itself; (3) a posterior vein or cunear branch, which takes its origin in the anterior portion of the cuneus; (4) an inferior or occipital branch, originating in the central portion of the first temporo-occipital convolution, consequently in the posterior portion of the convolution of the hippocampus. At the level of its origin the cuneo-limbic vein enters into relation with the radicles of the anterior cerebral vein, which is directed inversely toward the genu of the corpus callosum. It moreover anastomoses (1) by its upper branches with the internal cerebral veins, and by their intermeditation with the superior longitudinal sinus; (2) by its cunear branch with the cunear affluents of the superior longitudinal sinus; (3) by its occipital branch with the affluents of the lateral sinus and of the basilar vein. Owing to these different anastomoses an injection into the common trunk of the veins of Galen first fills the cuneo-limbic vein, then passes, little by little, through the aid of these anastomoses, into the radicles of the veins which are tribu-

taries of the superior longitudinal sinus and of the lateral sinus, and finally fills these two sinuses and their other affluents from the external surface of the hemispheres. *Vice versâ*, if an injection is made into a cortical vein of either surface of the hemisphere, this injection, either through the cuneo-limbic or basilar vein, reaches little by little the veins of Galen, and may even, if the pressure is sufficient, fill the latter system throughout its entire length. The author concludes that the filling of the cortical veins by an injection into the trunk of the veins of Galen and, *vice versâ*, the penetration into the latter veins of an injection made into the cortical veins is clearly explained by the superficial anastomoses uniting the radicle venules of the two systems. It in no way denotes, as Duret and Labbé are inclined to think, the existence of deep-seated or intercerebral anastomoses extending between the veins of the circumvolutions and the veins of Galen. These intra-cerebral anastomoses do, however, exist, and the author expresses an intention of describing them in a future work.

Ward Brinton <sup>1</sup><sub>May 6, '94</sub> quotes a case of abnormal termination of the thoracic canal, of which one branch of the bifurcation transversely crossed the base of the neck. After reviewing similar cases cited by other authors, he justly concludes that the surgeon may, in certain cases, be exposed to cutting or tearing the irregular branches arising from the bifurcation of the thoracic canal, which extend more or less upward into the thick part of the neck. Camus <sup>14</sup><sub>Dec. 27, '93</sub> states that the thoracic canal may be divided and may open into the left subclavicular by several orifices; it may be divided in the thorax into two canals, one of which opens into the left subclavicular and the other into the right subclavicular; it may also open into the right subclavicular.

H. Martin <sup>927</sup><sub>Jan. 27, '94</sub> finds that the coronary artery appears, in the rabbit, in the shape of a filled cellular bud analogous to that of the glands and formed of three rows of cells. Near its extremity, close to the aorta, this bud forms depressions or intercellular vacuoles, while its peripheral extremity gradually grows. The vacuoles intermingle among and form the orifice of the vessel, while the cells of the bud furnish the vascular endothelium. The other elements of the arterial tunic are formed by the neighboring tissues. The central cells of the bud do not appear to form red globules.

## NERVES.

Campbell <sup>187</sup><sub>July, '94</sub> proposes the following method for obtaining dry preparations of the brain: 1. As soon as possible after removal from the cranial cavity, the brain is stripped of its membranes and placed in a saturated solution of perchloride of mercury ( $7\frac{1}{2}$  per cent.), care being taken to avoid distortion of its configuration. In this solution it is allowed to remain for forty-eight hours, at the end of which time its shape will be fixed. 2. It is then washed in water and hardened in methylated spirit for from three to five weeks. (It is better that the spirit be changed two or three times during this period.) 3. When quite firm it is immersed in oil of turpentine and placed for three days in an incubator heated up to  $45^{\circ}$  C. ( $113^{\circ}$  F.). 4. It is changed into melted Cambridge soft paraffin and allowed to remain in the incubator, just above the melting-point of the paraffin, from four to five days. 5. It is extracted, cooled in water, all paraffin removed from the surface and sulci, and finally a thick coat of spirit varnish is applied.

L. Azoulay <sup>7</sup><sub>No. 6, '94</sub> describes, in the granular zone, stellated cells with short cylinder-axes, many times divided, and probably in contact with the protoplasmic prolongations of the granules. These prolongations extend upward toward the molecular zone and droop like branches of the weeping-willow. In the child born at eight and one-half months or at full term, and having lived several days, arborizations of climbing fibres are found over the entire body of Purkinje's cells, forming a very close net-work. In the child born at eight months, and dying after several hours, there will be found, in the same section, embryonic and also well-developed Purkinje cells; possibly the latter preside over certain instinctive movements, such as sucking.

Dejerine <sup>164</sup><sub>Feb. 22, '94</sub> reviews the researches made by him during a period of several years, by the aid of the secondary degeneration method, on the course of the encephalic bundles and, in particular, of the fibres constituting the root of the peduncle. The experiments were made in twenty-three cases of cortical lesions without any participation whatever of the central ganglia or of the internal capsule below the lesion. In all, seriated microscopical sections, extending from the cortical lesion to the level of the inferior stratum of the peduncle, were made and colored by the methods of Weigert and of Pal. His results are summarized as

follows: 1. All the fibres of the inferior stratum of the peduncle are of cortical origin and descend directly from the cortex into the root of the peduncle. 2. The internal fascicle of the peduncle originates in the cortex of the Rolandic operculum as well as in the adjacent portion of the frontal operculum, and in the capsule corresponds with the genu and the anterior portion of the posterior segment of the latter. In reality, the internal fascicle, sometimes designated under the name of psychical, or intellectual, fascicle, is neither more nor less psychical than the others. This bundle is of the motor order and corresponds with the region in which Horsley and Beever place the cortical centres of the inferior facial, of the tongue, the pharynx, and the larynx. It is almost lost in the protuberance, in three of the cases studied the bulbar pyramid only presenting doubtful lesions. 3. The external fascicle of the peduncle, or Türck's fascicle, originates in the middle portion of the temporal lobe, principally the central portion of the second and third temporal. This bundle, considered as sensitive, is in no way so. Ferrier has cut through it in the monkey without producing any disturbance of sensibility, and anatomo-clinical facts also go to show the error of this opinion. It also becomes lost in the protuberance, and, if the fibres extend as far as the bulb, they do not pass through the pyramid, which, in four cases, did not appear to be decidedly altered. 4. The central portion of the root of the cerebral peduncle is formed of fibres having their origin in the Rolandic zone, from the fifth inferior of the latter to its upper portion, from the most posterior portion of the second and third frontal, comprising also the paracentral lobule and the anterior extremity of the parietal lobe. In the author's opinion this zone corresponds to the cortical origin of the pyramidal bundle. 5. If the lower stratum of the peduncle be voluntarily separated into five divisions, the internal fifth, according to the author, corresponds to the Rolandic operculum and the adjacent portion of the frontal operculum; the external fifth, or Türck's fascicle, to the middle portion of the second and third temporal; and the three middle fifths, or pyramidal bundle, properly speaking, to the upper four-fifths of the Rolandic zone, the paracentral lobule, and the anterior portion of the parietal lobe.

Dana, <sup>242</sup><sub>May, '94</sub> has studied the brain of an Indian from Bolivia, 30 years old, six feet seven inches in height. The principal peculi-



arities noticed were: the relatively large occipital bone; the small frontal lobe and cerebellum; the transverse fissuration; the wide angle made by the Rolandic fissures; the numerous short clefts; the long, confluent first temporal; the confluence of the parieto-occipital and temporal; the short opercula and consequent exposed island of Reil. The corpus callosum, considering the size of the brain, is relatively small. The limbic lobe, the temporal lobe, and the motor area are liberally developed. The distribution of gray matter shows a rich endowment of the senses of taste, smell, and hearing, but a poor supply for visual and intellectual-language centres.

Bonnier <sup>927</sup><sub>No. 21, '94</sub> estimates that the ascending parietal circumvolution—at least, in its lower two-thirds—is the vestibular centre of perception, and furnishes the images indispensable to motor ideation,—an exclusively sensory centre, having under its direct dependence the automatic and co-ordinated motor centres situated lower down.

Fraser <sup>16</sup><sub>June 1, '94</sub> furnishes a communication upon what he calls the “lobus olfactorius impar” of birds and mammals. This is the triangular recess of Schwalbe; that is to say, the hollow space existing above the anterior commissure and between the pillars of the fornix. This body is of great importance, and is found throughout the entire series of vertebrates. Symington and Haddon dispute the author's opinion, and fail to see what connection this body has with the olfactory organ.

De Sanctis <sup>59</sup><sub>May, '94</sub> presented to the International Congress at Rome a communication with the following conclusions: 1. The corpus mammillaire of man is developed from two ganglia,—the median and the lateral. The lateral ganglion has no connection with the pedunculus corporis mammillaris, but is in relation with the columna fornicis, which arises in great part from it, and, to a lesser degree, from the median ganglion. 2. The median ganglion of the corpus mammillaire is in relation with the complexus of the fascia of Vicq d'Azyr and of the fascia segmentalis of Gudden. 3. The medullary capsule (Gudden) of the corpus mammillaire is in relation, by its ventral portion exclusively, with the columna of Vicq d'Azyr—fascia segmentalis—in less part with the columna. 4. The rete endomammillaire is formed almost wholly from the columna, while the two ganglia are given off from the fascia of

Vicq d'Azyr. 5. The fascia of Mahaim has no relation with the fasciæ of the columna fornicis.

Bertelli <sup>996</sup><sub>July 10, '94</sub> has studied the relations between the pia mater and the grooves of the spinal cord. The separations extending into the median and intermediate anterior and posterior grooves originate in the pia mater in two lamina. There is a great analogy, notwithstanding the reduction in proportions, between the arrangement of the anterior and posterior grooves. In the former the two layers of pia mater send forth transversal prolongations toward the gray substance and others toward the white commissure, furnishing lamellæ and grains to the vessels. The separation of the intermediate anterior groove, when this is well developed, also sends off filiform prolongations on the sides and lamellæ from its posterior edge. The separations of the posterior grooves are formed of thin prolongations and of lamellæ sending off intramedullary prolongations, forming a very delicate net-work. In the collateral anterior and posterior grooves only very small lamellæ are found, serving as support for the vessels.

Chipault, <sup>452</sup><sub>July, Aug., '94</sub> following the example of Jadelot and Reid, has studied the connection between the origin of the rachidian nerves and the spinous apophyses in vertebrates. The technique of the author is as follows: He first prepares, with the aid of a millimetre-rule and a compass, a drawing (natural size) of the posterior portion of the spine, dissected from the prone subject; then, the arches having been successively removed with Mathieu's punch, he places a second drawing above the first (made with the same precaution), of the dura mater and the roots in their extradural course; finally, he makes a third design on the same sheet, after median incision and lateral eversion of the meninges, reproducing the cord and the intra-dural portion of the roots. He thus has three superposed designs, which can be, at will, each made with a differently-colored ink, and from the examination of which the reciprocal relations between the nerve-roots and the spinal apophyses can be readily determined. The author made researches upon 20 subjects: 3 fetuses born before term (2 female, 1 male); 2 infants at full term (2 males); 8 children (3 boys of 4, 6, and 9 years, and 5 girls of 5, 7, and 13 years); 7 adults (2 men and 5 women). He arrived at the following conclusions concerning the adult: 1. In the cervical region it is necessary to add one

to the number of an apophysis distinguishable by palpation, in order to have the number of roots originating at its level. 2. In the upper dorsal region two must be added. 3. From the sixth spinal dorsal apophysis to the eleventh three must be added. 4. The portion below the eleventh dorsal apophysis and the subjacent interspinous space correspond to the last three lumbar pairs. 5. The twelfth dorsal apophysis and the subjacent space correspond to the sacral pairs. In the child the relations are somewhat modified, inasmuch as the roots originate relatively higher than in the adult. The formula given above must, therefore, be subjected to a corresponding modification. Thus, in the child, in the upper dorsal region, from the first to the fourth apophysis, we must add three, in order to arrive at the number of the corresponding roots; in the middle dorsal region, from the fifth to the ninth apophysis, we must add four. The author endeavors to explain the differences existing, in this connection, between the adult and the child, and finds the reason in the development of the spinal cord itself, which, from the age of 6 or 7 years (the period at which the roots reach their adult level), have a greater proportional development than that of the portion of the spine in which it is contained.

Marinesco <sup>14</sup><sub>June 13, '94</sub> has made experiments for the purpose of determining how far downward the descending branches of the posterior roots extend. Having cut the second cervical pair, he observed a descending degeneration located in the internal portion of Lissauer's zone and in the postero-internal radicular zone; this degeneration disappeared at the level of the root of the fourth cervical pair. The descending branches in question are thus very short. The author estimates that their physiological function is to diffuse intense excitations downward and to provoke reflex acts.

L. Sala <sup>29</sup><sub>B. 42, H. 1</sub> has studied the origin of the acoustic nerve by the aid of the Golgi and Weigert-Pal methods. His researches were made upon fetuses of the calf and upon newly-born cats. The following are the principal conclusions: 1. The nucleus of Leiters, the posterior nucleus, and the nucleus of Bechterew bear no relation to the acoustic nerve. The cells which constitute these three nuclei belong to the first type of Golgi and send forth fibres which are probably lost in the reticular elements. 2. The anterior nucleus forms the true original cell of the posterior root of the

acoustic, or cochlear, nerve, while the acoustic tubercle represents the centre of the greater portion of the fibres forming the acoustic striæ. 3. From an anatomical stand-point the anterior nucleus comprises two kinds of cells,—central and peripheral. (a) The central cells take on the character of nerve-cells; their axis-cylinder prolongations are like those of the second type of Golgi cells; they form a plexus from which escape the fibres of the anterior internal portions of the posterior root of the acoustic. (b) The peripheral cells are encapsulated elements which, morphologically, resemble the peripheral nerve-cells; the prolongations emanating therefrom mix, at a right angle, with the fibres of the anterior and posterior roots. 4. The trapezoid body contains fibres which come from the anterior nucleus and which have the same importance as one of the branches of the T-shaped division of the nerve-prolongations of the more peripheral cells, also belonging to this anterior nucleus. 5. The anterior root of the auditory nerve is united to the cerebellum by fibres coming from the root and following along the internal portion of the lower cerebellar peduncle, which end in the embolus and the nucleus of the roof. 6. The peripheral portion of the anterior nucleus acquires the significance of a true peripheral ganglion analogous to a spinal ganglion. It belongs both to the anterior root and to the internal portion of the posterior root of the auditory nerve.

Coyne and Cannieu<sup>188</sup><sub>Apr. 29, '04</sub> have taken up the study of the membrane of Corti, especially the manner of its external insertion. Their researches were made upon a great number of sections of the mastoid process in man, cats, dogs, guinea-pigs, rats, mice, sheep, and oxen. It is seen upon a longitudinal section of the cochlea, in the form of a membrane rather large in the central portion, terminating in two long and thin extremities, very nearly alike, one of which—the internal—is inserted upon the protuberance of Huske, and the other—the external—upon the organ of Corti and the cells of Claudius. F. Pinkers<sup>1006</sup><sub>Sept., '04</sub> describes a cranial nerve, not yet recorded, which has its origin upon the ventral surface of the intermediate brain near the *recessus opticus*. This nerve, which is very fine, takes an outward and forward course, and penetrates into the connective tissue of the nasal capsule. It applies itself upon the median bundle of the olfactory nerve without anastomosing with it, and finally terminates in a



small agglomeration of cells situated at the extremity of the nose, upon the dorsal wall of the external nostrils.

Mauclaire, <sup>7</sup><sub>No. 3, '94</sub> from numerous observations made upon the cadaver, concludes that the nerves and arteries are often the cause of their reciprocal duplication; for, at the level of a normal or abnormal arterial bifurcation, a nerve-trunk will often be found, and, inversely, at the level of nerve duplications, a vascular branch will be seen. In the palm of the hand, in one subject, he found five nerve-branches coming from the median and the cubital and losing themselves upon the digital arteries.

William Anderson <sup>277</sup><sub>Apr., '94</sub> writes concerning the course and relations of the deep branches of the cubital nerve. According to his researches, this nerve-branch is found applied against the radial surface of the pisiform, or against the cubital surface of the cuneiform apophysis, in the vicinity of its summit. As these two bony points form an appreciable prominence, it is easy to trace the course of the nerve preparatory to any surgical operation. Guided by these facts, the author was able, in November, 1892, to find and to suture a branch of the cubital nerve which had been accidentally severed.

Petersen <sup>277</sup><sub>Jan., '94</sub> has studied the origin and the distribution of the nerves in the lower extremities, the following conclusions being evolved from his numerous researches:—

1. There is a well-marked *individual variability* in the composition of the lumbo-sacral plexus. The position of the plexus shows a tendency to shift in relation to the spinal cord, and this shifting is much more frequent in a caudal than a cephalic direction. This fact forms an adverse argument to Rosenberg's theory of the philogenetic shortening of the vertebral column. 2. The variations in the position of the limb-plexus are not, strictly speaking, segmental,—that is, do not imply a shifting of a whole spinal nerve, but may affect only a few (contiguous) fibres of a nerve; and the limits within which the variations occur are very narrow,—between the twelfth thoracic or, more frequently, the first lumbar nerve and the third sacral nerve. These two facts indicate (*a*) a variability in the extent of the area of the spinal cord involved in the composition of the plexus,—in the restriction or amplification of the area of outflow of the spinal nerves from the cord to the limb; and (*b*) that the segmental character of the spinal nerve-

roots possesses mainly a morphological significance, and from the point of view of the composition of the plexus and the innervation of the limb is not of primary importance. 3. The examination of the spinal origin of the several nerves derived from the lumbo-sacral plexus confirms in the main the results of Gosler. The origin of the different nerves varies with the position of the *n. furcatis*, for the most part, and with the position of the plexus formation generally; but the several nerves of distribution to muscles and skin preserve a similar and constant relation to one another, irrespective of changes in the position of the plexus. 4. The associated variability of the constitution of the plexus and the origin of the nerves derived from it imply the existence of a still deeper variability in the position of the columns or tracts of cells in the spinal cord which preside over the innervation of the limb. 5. Among the cases examined only one showed a correlated variation of the vertebral column and lumbo-sacral plexus. That case supports the view that the osseous and nervous variations may be related to one another. More information, however, is wanted before one can decide whether or not they are only coincident. 6. The spinal nerves entering the lumbo-sacral plexus are distributed in numeral order and in a continuous series to the dorsal and ventral surfaces of the lower limb from the pre-axial to the post-axial border. The central spinal nerves in the plexus extend farthest into the limb, the proximal and distal nerves a less distance, as one passes from a proximal to a distal point in the pre-axial border, and from a distal to a proximal point in the post-axial border. The number of nerves supplying the pre-axial border of the limbs is greater than that supplying the post-axial border; in other words, the distal nerves extend farther into the limb than the proximal nerves of the plexus,—*e.g.*, the penultimate nerve (S. 2) extends peripherally to the skin of the outer border of the foot and the intrinsic muscles of the sole, while the third lumbar supplies no muscles and only a small cutaneous area below the knee. 7. In regard to the innervation of the skin at the root of the limb in relation to the pre-axial and post-axial borders, there is a less distinct division of the cutaneous nerve into dorsal and ventral branches than elsewhere,—*e.g.*, ilio-inguinal, genito-crural, small sciatic. On the dorsal and ventral surfaces at the root of the limb there are areas or lines indicating the meeting-place (and

overlapping) of the most proximal and distal nerves of the plexus. In front of them, pre-axially, the skin is supplied by more proximal nerves; behind them, post-axially, by more distal nerves; while, at the peripheral end, the area, or line, the intermediate nerves appear and take their place in the innervation of the skin. These lines appear to indicate the vestiges of areas which, in the absence of the nerves proper to them (these in their course to the periphery of the limb being buried deeply in its substance), are supplied from the nearest available source. The intermediate nerves are carried out to the periphery of the limb in their entirety, and cannot reach the surface so readily as the more proximal and distal nerves. 8. In connection with the innervation of the muscles of the limb, the rules formulated by Herringham for the supply of the muscles of the upper limb do not appear applicable to those of the lower limb. In their innervation the muscles follow the same general law as the skin. They are supplied by a continuous series of spinal nerves from the pre-axial to the post-axial border on both surfaces of the limb. The centrally-placed nerves extend to the periphery, the proximal and distal nerves extending a shorter distance into the limb. The muscles of the thigh and buttock are supplied by all the constituent nerves of the plexus in order from before backward, the muscles of the leg and foot only by intermediate nerves,—*e.g.*, on the dorsal surface the thigh and buttock are supplied by the second lumbar to the second sacral nerve, the muscles of the leg and foot by the fourth and fifth lumbar and first sacral nerves; on the ventral surface the muscles of the thigh are supplied by the second lumbar to the third sacral, the muscles of the leg by the fourth lumbar to the second sacral, the muscles of the foot by the fifth lumbar to the second sacral. 9. The knee-joint is innervated by the third, fourth, and fifth lumbar and first sacral nerves. Of these, the nerves contributing to the greatest extent to the supply of the joint in the normal cases, are the fourth and, to a less extent, the fifth lumbar nerve. 10. The perineum derives its nerve-supply partly from the most proximal nerve of the lumbo-sacral plexus (first lumbar), mainly from the most distal nerves (second, third, and fourth sacral). An analysis of the branches of the pudic nerve shows that the spinal nerves composing it are distributed in numerical order from before backward; the second and a minor

part of the third sacral nerves supply the penis; the third and a minor part of the second form the perineal branch; the fourth and a minor part of the third, the inferior hæmorrhoidal branch. The innervation of these parts indicates that they are placed morphologically in the ventral axis of the body, and in a position post-axial to that of the hind-limb, the nerves supplying them being continuous with those which innervate the post-axial border of the limb. 11. The root and part of the dorsum of the penis are supplied by the ilio-inguinal nerve (first lumbar), the rest of the organ by the second and, to a less extent, the third sacral nerves. These are, respectively, the most pre-axial and post-axial nerves entering into the formation of the lumbo-sacral plexus proper; the root of the penis is thus the meeting-place in the ventral axis of the trunk of the ventral terminations of the nerves which bound the plexus before and behind. Thus this region, the point of junction of two widely-separated series of nerves, between which the intermediate nerves are drawn out in their entirety to form the limb-plexus, may be regarded as the axial point of commencement of Sherrington's "ventral axial line of the limb." This point may be traced into continuity with a similar line of the limb itself, which in the ventral surface demarcates the area of distribution of the ilio-inguinal (first lumbar), obturator (second, third, and fourth lumbar), and small sciatic nerves (first, second, and third sacral).

Ramón y Cajal, <sup>927</sup><sub>Dec. 30, '93</sub> besides the ganglia of the vertebral grand sympathetic (ganglia of the celiac plexus, ganglia of the hypogastric plexus, ophthalmic ganglia, sphenopalatine ganglia, and probably also those of the heart), of which the cells have two forms of expansion,—protoplasmic ramifications and an axis-cylinder nerve prolongation,—admits two other varieties of ganglia: those which he terms *true visceral ganglia*, and which are represented by the ganglia of insertion (pl. of Meissner and pl. of Auerbach) and those of the bladder and of the œsophagus; and others, which he designates as *interstitial ganglia*, and which are monocellular, situated in the interstices of the glandular tissue or in the thickness of the villusities (interstitial cells of the glands of Lieberkuhn, of the pancreas, the salivary glands, etc.). With regard to the anatomical constitution of the true visceral ganglia and of the interstitial ganglia, the author advances the following conclusions



as probable: 1. The visceral ganglia are composed of multipolar cells, of which the expansions, after ramifying several times, pass into the plexuses which terminate in the smooth muscular fibres or in the glandular cells. 2. Each ganglion also possesses transition fibres (which perhaps continue with the fibres of the vertebral grand sympathetick) and collaterals terminating between the nerve-cells. 3. All glands, and perhaps all groups of smooth fibres, however small, contain interstitial nerve-cells, of which the expansions re-enforce the plexus formed by the visceral ganglia and the fibres of the vertebral grand sympathetic. 4. Every chiasm represents not only a point of interlacing, but also a bifurcation point for several nervous transition fibres and for expansions of the visceral ganglionic cells. 5. No anastomoses exist, either between the cells of the visceral ganglia or between the transition fibres or the collaterals. The same is probably true of the interstitial fibres. The researches upon which these conclusions are based were made by the aid of Golgi's method, and particularly by the double impregnation method of Cajal on guinea-pigs, rabbits, dogs, rats, mice, and oxen.

Sacerdotti <sup>126</sup><sub>Apr. 15, '94</sub> discusses the nerve-terminations of the thyroid gland. The nerves penetrate into the gland in the form of fascicles of varying size, which accompany the vessels and send off to the latter, during their course, fibres which dispose themselves in perivascular plexuses. After having become divided, the nerve-bundles are reduced to isolated fibrils which ramify in the intervesicular connective tissue and there form a delicate net-work corresponding to the distribution of the intra-glandular connective tissue and the capillaries. Beside these fibres there exist, especially in the thyroid of the dog, numerous ganglion-cells of varied dimensions and irregular form, sending forth prolongations (2 to 5) regular in calibre, long, and only slightly ramified, which interlace with nerve-fibrils. It is difficult to determine whether any one of them is special or whether all are of a nervous nature. The thyroid glandules also contain nervous net-works (dog, lamb) which are distributed as in the principal gland. The author resorted to Golgi's method, modified as follows, according to the indications given by Golgi: The specimens remain during three or four weeks, or even more, in the osmio-bichromic mixture; they are afterward washed in a semi-saturated solution of acetate of

copper until a precipitate is no longer formed, when they are again placed in the osmio-bichromic solution, in which they remain five or six days, or over, before being immersed in the solution of nitrate of silver.

## DIGESTIVE APPARATUS.

Barillet, <sup>277</sup><sub>Sept., '93</sub> in an article devoted to the numerical anomalies of the teeth, reviews what has been written on this subject by French and other writers, and what he has observed himself in in his surgical practice. He studies the dental anomalies in certain animals,—monkeys, carnivora, herbivora, marsupians, and birds,—stating that, although the birds of the present time have no teeth, this was probably not the case in the geological period. Marit and Cope have cited numerous birds existing in America during the chalk period which had teeth. Of the archæopteryx of Solanfer, we are told that there were teeth in its mouth, which fact forms a new feature of resemblance between the saurians and this bird, of which the reptile type is already so pronounced. This disposition is still met with, in the form of rare anomalies, in birds of prey, in the palmipedes, and gallinaceæ. The author arranges into the following classes the pathological conditions produced in dental anomalies by supernumerary teeth: 1. Deviation of the normal teeth, which may lean either forward or backward, and constitute not only an ungraceful appearance, but also a condition of great discomfort. 2. Atrophy of the neighboring teeth, which cannot attain the size they should have possessed. 3. A certain amount of interference in the articulation of sounds. 4. Inflammatory conditions similar in some cases to those observed during the pathological eruption of the wisdom-teeth.

Zuccarelli <sup>2031</sup><sub>'94</sub> has studied the stomach in 124 children of various ages, from the fifth foetal month up to sixteen years. With regard to the position of the organ, he arrived at the following conclusions: In 91 children of from 1 day to 1 year old it was 65 times vertical, 18 times slightly transversal, 9 times completely transversal; in 9 children over 12 months old it was once vertical, 8 times transversal. The capacity of the stomach from the fifth to the ninth month of foetal life progresses from 9 to 23 cubic centimetres ( $2\frac{1}{4}$  to 6 drachms), on an average; from one to six days the average is 40 cubic centimetres ( $1\frac{1}{4}$  ounces); from

seven to fifteen days, 65 cubic centimetres ( $2\frac{1}{10}$  ounces); from fifteen days to one month, 72 cubic centimetres ( $2\frac{2}{5}$  ounces); from one to two months, 86 cubic centimetres ( $2\frac{3}{4}$  ounces); from two to five months, 147 cubic centimetres ( $4\frac{3}{4}$  ounces); from five months to one year, 364 cubic centimetres ( $11\frac{1}{4}$  ounces).

Rawitz <sup>316</sup><sub>v.9, No.7</sub> observed in the jejunum of the *macacus cynomologus*, beside the villosities presenting the usual configuration, others, more voluminous, and bristling over their entire surface with secondary villosities, histologically normal, having a connective axis covered with epithelial elements. According to the author no histologist has yet mentioned this anatomical disposition.

Pilliet <sup>7</sup><sub>No.6, '94</sub> found, in a man who died at the age of 55 years, a double row of blackish prominences on the large intestine, containing faecal matter, solid, but not very hard. They were so many diverticula of the intestinal cavity, some in the mesocolon or the mesorectum, others in the pedicle of the epiploic fimbriæ. The first degree of these small herniæ of the mucous membrane was visibly constituted by the normal prominences of the intestine, the largest attaining the size of an ordinary marble. These diverticula began at the colon and from there extended, augmenting in number and volume, to the rectum. The author does not know how to account for their production, and has not met with a similar condition in mammals which would aid in their scientific interpretation.

Jonnesco and Juvara <sup>7</sup><sub>No.1, '94</sub> have observed, in numerous dissections of the cæcal appendix, an irregular disposition of this appendix and its meso, which one of them had denied in a previous work. The vermiform appendix, in very rare cases, is found situated in the anterior portion of the cæcum and the ileum, ascending parallel with the cæcum; it will also be found that the ileocolic artery, following the meso-appendix, which is anterior, is also in front, and that the ileo-cæcal fossa is, for this reason, absent. In one subject they found a veritable meso in the left colic artery, indicating the possibility of strangulation of the intestine at the level of this artery.

Rogie <sup>220</sup><sub>Sept., '94</sub> successively studies (1) the relation existing between the vessels and the epiploic bursa; (2) the vestibule of the epiploic bursa and the ligaments of the liver; (3) the true epi-

plioic sac; (4) the meso of the digestive tube and the peritoneal relations of the duodenum; (5) the shape and relations of the pancreas. This work completes his previous researches concerning the development of the peritoneum and the subdiaphragmatic portion of the digestive tube. He gives the following conclusions concerning the general evolution of the digestive tract and its mesos: (a) Torsion of the intestinal loop results in the three following phenomena: (1) ascension of the recurrent branch of the umbilical loop and the bend (future splenic flexure), which unites itself to the posterior intestine, owing to the lengthening of the latter from below upward; (2) the course inversely—that is, from above downward—of the secondary loops formed at the expense of the descending branch, the umbilical extremity of which is fixed; (3) retraction within the abdominal cavity (through atrophy of the vitelline canal) of the entire primary loop (enormously developed), which, together with its common jejuno-ileo-colic mesentery, assumes a position in the frontal plane. (b) The results are: (1) the definite arrangement of the small and large intestines; (2) the passage of the third portion of the duodenum and of the tail of the pancreas behind the superior mesenteric vessels; (3) formation of a fourth portion of the duodenum of upward direction and situated to the left of the preceding vessels. (c) With regard to the form of the pancreas, separately considered, the author believes that it is the result of the following conditions: (1) inverse deviation of the mesogastric and of the mesoduodenum, the first leaning to the right and the latter to the left, giving rise to its rectangular shape; (2) torsion of the primary intestinal loop around the upper mesenteric artery, and consequent hook-shaped curvature inward of the lower extremity of the vertical segment of this gland.

N. Czermak <sup>13</sup><sub>May 15, '94</sub> states that, as follicles are developed at the expense of the mesenchyme, the epithelium remains passive. In order to form the reticulum the prolongations of the cells undergo a chemical change; the body of the cells around the nucleus remains the same, furnishing the buds for the extension of the net-work. Later on certain of these cellular bodies may apply themselves against the fibres constituting the net-work and form the flat cells of the nodal points. In the germinative centre of the ganglion there will be found, besides numerous mitoses, fragmented nuclei forming granulations. The author believes that



from these fragments of cells small bodies originate capable of multiplying themselves, and afterward producing the blood-globules.

#### GENITO-URINARY APPARATUS.

A. McShane <sup>12</sup><sub>Sept., '94</sub> reports a case of abnormal position of the right kidney, of congenital origin. The organ was situated above the promontory and above the fourth lumbar vertebra and the bifurcation of aorta, and was covered by the cæcum and the ascending colon. Its anterior surface was connected with the peritoneum, the posterior surface with the lumbar vertebræ and the sacrum; the upper extremity touched the aortic bifurcation and the lower the right sacro-iliac articulation. Meslay <sup>7</sup><sub>No. 10, '94</sub> noticed, in a little girl who died of broncho-pneumonia, a congenital deflection of the left kidney, which was situated against the left lateral portion of the last lumbar vertebra. Its artery, which was single and much lengthened, proceeded normally from the abdominal aorta. The kidney was located in the retro-peritoneal cellular tissue; no meso existed. The suprarenal capsule remained in the hypochondrium, near a supernumerary spleen. The right kidney was entirely normal as to situation, vascular supply, and relations. Vermorel <sup>7</sup><sub>Apr. 6, '94</sub> observed, in a man of 50 years, a fusion of the two kidneys at their lower extremities. These two organs, arranged in horseshoe form, were separated from the corresponding suprarenal capsules by an interval of a finger's breadth. There were three renal arteries: two, directed transversely, representing the normal renal arteries; the third, the central one, separated from the aorta a little below the others and descended vertically upon that portion of the mesenchyme uniting the two kidneys. The renal veins and the ureters presented nothing abnormal.

Farquharson <sup>277</sup><sub>Apr., '94; Sept. 1</sub> reports a case of displacement of the left kidney, observed in a young woman of 32; the organ was situated a little to the left of the median line, upon the two lower lumbar and the first sacral vertebræ. The arteries, two in number, came from the aorta; the corresponding suprarenal capsule occupied the usual position. Stocquart <sup>868</sup><sub>Aug. 16, '94</sub> reports a case of renal symphysis in a subject of 66 years. The renal parenchyma, of horseshoe shape, was situated with its middle portion in front of the aorta, opposite the fourth lumbar vertebra. The right kidney

measured, vertically, twelve centimetres; transversely, four and one-half centimetres; the left kidney, twelve centimetres vertically and three and one-half transversely. The intermediate portion, connecting the two lower extremities and thus forming the central portion of the horseshoe, measured five centimetres horizontally and three centimetres vertically. Each kidney was provided with a ureter and a special vascular apparatus, of which the author gives a detailed description.

Adami and Day<sup>90</sup><sub>Oct., '94</sub> found, at the autopsy of a man 65 years of age, a double ureter on the left kidney, originating from two separate renal pelves and opening, by two distinct orifices, into the kidney. The right kidney and its ureter were normal. Füh,<sup>317</sup><sub>Apr. 7, '94</sub> at the autopsy of a little boy of 4 years, besides a condition of eventration, found that the bladder was divided into two cavities of almost equal size, about that of a nut, communicating with each other by an orifice having a diameter of 0.5 cubic centimetre at the level of the point of the trigone. A ureter opened into each cavity, and the urachus extended from the point of the left half of the bladder to the umbilicus. The urethra opened in the left half below the communicating opening; the urine of the right half must thus have passed into the left in order to be voided. The author explains this malformation by the division of an opening at first single. The middle portion of the posterior wall of the bladder, pushed forward by the rectum, united with the anterior wall, while the lateral portion developed freely. A complete separation did not take place because the urine contained in the one side had, of necessity, to pass through to the other in order to be evacuated.

Testut<sup>920</sup><sub>July 9, '94</sub> studied the situation of the fixed urethra upon sections of frozen subjects. His experiments were made upon four adult subjects of from 30 to 40 years of age. After having caused them to be frozen in the upright position, he practiced a series of vertical and antero-posterior sections upon the pelvis. The examination of the median section, including the urethra throughout its whole length, enabled him to determine a certain number of facts concerning the topography of this canal, which he gives in the following conclusions: "1. The neck of the bladder is always found situated above and behind the lower extremity of the symphysis or symphysian angle. An average interval of

twenty-three millimetres separates it from this angle. 2. An horizontal line starting from the neck meets the symphysis at or a little below its middle portion. In a case studied and represented by Braun it passed by the upper extremity of the symphysis, but this case is quite exceptional. 3. The distance separating the neck from the symphysis averages about twenty-three millimetres. 4. The most slanting portion of the urethra is always located in front of the central peroneal aponeurosis, most frequently at the level or in the neighborhood of a vertical line crossing the symphyseal angle. 5. The prepubic angle of the urethra has, with reference to the pubis, a very variable situation. I have always found it below an horizontal line crossing the symphysis at its lower extremity, except in one case where it extended up to, but not beyond, this line. 6. The length of the fixed urethra is, on an average, from sixty-five to seventy millimetres, of which forty millimetres correspond to the portion situated above the declining point and twenty-five or thirty to that below this point. 7. If from the horizontal line crossing the neck we extend two vertical lines, one toward the point of decline and the other toward the prepubic angle, it will be found that the first of these measures, on an average, thirty-eight millimetres, the second only thirty-two millimetres. Thus, the urethra descends thirty-eight millimetres below the level occupied by the neck, and afterward ascends in order to reach the prepubic angle. This ascent, however, is but slight, averaging only six millimetres. I may add that the urethra does not always take an upward direction between the point of declination and the prepubic angle. In two of my subjects the distance of projection, taking an horizontal line, between the neck and the most slanting point of the urethra, is exactly equal to that separating this same horizontal line from the prepubic angle. Consequently, in these two subjects, the canal of the urethra, from the point of the greatest decline to the prepubic angle, follows a perfectly horizontal course, and the same occurs in the case of Braun cited above. 8. The distance in a straight line separating the neck from the prepubic angle—otherwise, the cord of the bow described by the fixed urethra around the symphysis—is estimated by Sappey at seventy millimetres. On the subject studied by Braun it reaches seventy-five millimetres. These figures appear to me to be too large. In my four cases I obtained fifty-eight, fifty-four,

fifty-five, and again fifty-four millimetres,—thus an average of fifty-five millimetres. 9. The assertion of Gély, that the urethral curve closely resembles a section of a curved outline corresponding with that of a circle of sixty millimetres, and that its length represents slightly less than the third of this circumference, has received considerable notice. Formulated in such an explicit fashion, and without considering individual variations, this proposition is not acceptable. Guyon, in two subjects, found a curve section measuring sixty millimetres in the first, but only thirty millimetres in the second. I may state that in the four subjects examined by me, and of which the urethral sections are actually in my possession, I have never met with, in the course described by the urethra, a section of a true actual curve, but rather a very irregular curve, lending itself the less readily to a geometric definition, since it varies in each subject. The only formula evolved from the comparative study of my cases is the following: *The fixed urethra is composed of an initial segment which is nearly rectilinear, and of a terminal segment likewise nearly rectilinear, joined by a union curve.* This union curve in itself varies greatly in length and condition, and is not necessarily a circumference section. Taking two tangents from the external side of the two segments, initial and terminal, and prolonging them toward each other, they will be found to unite behind the canal of the urethra, forming an angle which might be called the *curvature angle of the fixed urethra*. But this angle, instead of being fixed, varies greatly; in my four subjects I found it obtuse in only one of them (one hundred and six degrees), acute in the three others (fifty-eight, sixty-three, and sixty-five degrees). It may, therefore, be assumed that there are almost as many variations of the urethra as there are individuals."

S. J. Smith<sup>199</sup><sub>Apr., '94</sub> reports the case of a man, 40 years old, in whom the right scrotum inclosed a testicle, while there was another which showed a tendency to likewise descend into the scrotum. Pressure upon this supernumerary testicle caused a crushing sensation, which also affected the other testicle on the same side. Guérmonprez<sup>220</sup><sub>Oct. 20, '98</sub> describes the case of a young man of 30 years, tall, very muscular, and with no beard. Upon the pubis hair grew like that found at the beginning of puberty. He had a high-pitched, thin voice. The genital organs were distinctly masculine, but atrophied, the scrotum only slightly prominent,



adherent to the perineum, and divided by a median furrow giving to the whole somewhat the appearance of an imperforate vulva, which was heightened by the fact that at the top the skin of the scrotum was prolonged on the sides and above the root of the penis like the labia majora above the head of the clitoris. Within the scrotum, on the right, were found the elements of the cord and a very small testicle, smaller than a bean, soft, mobile, and eluding the fingers; on the left the elements of the cord were discernible, but there was no testicle. Pressure on the cord was painful. The penis was very short (about five centimetres). This is probably a case of testicular atrophy due to mumps.

Griffiths, <sup>277</sup><sub>Jan., '94</sub> referring to retained testis, gives the following conclusions: 1. The retained testis in man and in the domesticated animal is of small size, and the seminal tubules, though smaller, are more distinct, owing to the disproportionate amount of intertubular connective tissue. 2. The walls of the tubules are thick from the formation of fibrous tissue on the inner surface of the tunica propria; and the epithelium is scanty and columnar and there are no traces of spermatogenesis. 3. The testes in cryptorchids, though they are incapable of producing spermatozoa, are yet capable of exerting that influence which the natural testes exert upon the development of the penis and the growth of the body. 4. The function of the testes—namely, that which influences the growth of the body at puberty—is distinct from that of the production of spermatozoa, the latter necessitating a more specialized development of the tubules of the gland than the former. The testes do not acquire their full (spermatozoa-producing) function except at the farthest point of descent from their primary position.

The same author, <sup>277</sup><sub>Jan., '94</sub> having had occasion to observe two eunuchoid subjects, studied the anatomical constitution of the testicle, the epididymis, and the prostate. He gives the following conclusions: 1. In eunuchoid persons the testes are of small size and almost entirely composed of fibrous tissue, the seminal tubules being represented by fibrous rods with fissure-like lumina containing atrophied epithelial cells. Although thus altered, the testes retain their normal shape and form. 2. The epididymes are large relatively to the bodies of the testes, and the tubules in most of the lobules of the globus major are natural, the tubules in some

few lobules being altered, as if by chronic inflammation. 3. The prostate gland is small, tough, and fibrous, and the glandular tubules are but few in number and but imperfectly developed. 4. The vesicular seminales are also of small size and devoid of any secretion in their interior. 5. Where the testes lose their power of growth, from whatever cause, the individual develops at puberty like a eunuch deprived of his testes in early life. Such a person I have, therefore, called a "eunuchoid."

Beuttner <sup>317</sup><sub>No. 49, '93; Dec. 23</sub> reports the case of a young girl, 18 years old, who had never menstruated, whose vulva was normal, hymen present and leading into a short sinus one-fifth of an inch deep. There was no vagina. A rudimentary bicornate uterus could be felt by rectal palpation, together with the ovaries. The ovaries, tubes, and uterus were removed. The ovaries, which were well developed, presented normal follicles, follicular cysts filled with serum and with blood, and cicatrices of old follicles. Roesger <sup>2</sup><sub>June 16, '94</sub> states that the canals of Müller do not open into the uro-genital sinus. The blind end of the united canals, covered with epithelium, unites with the epithelium of the sinus to form the hymen. About the fourth month the cylindrical epithelium of the utero-vaginal canal changes into pavement epithelium in the inferior portion of the latter. At the end of the fifth month a circular enlargement of the vaginal epithelium forms the vault of the vagina. The vaginal portion of the uterus is developed in the sixth month by hypertrophy of the mesoblastic elements. The canals of Müller have no muscular coating. The formation of the muscular fibres begins when the canals are united, forming the uterus, and when the vagina is already developed. The arteries, which are at first simply endothelial tubes, are provided with muscular tissue which is much thicker than elsewhere.

Testut <sup>7</sup><sub>No. 12, '94</sub> has studied the influence which the bladder, the rectum, and the intestinal loops may exert upon the position of the uterus, which he regards as an organ of unstable equilibrium, the direction of which is, so to speak, at the mercy of the viscera surmounting or surrounding it. It would thus seem difficult to define what is called its normal position. To his mind this normal position is the one assumed by the organ when the subject is in the upright position, and when, the rectum being almost empty and the bladder moderately distended, the intestinal loops exert

no influence upon it. The following case, observed in the dissecting-room, enabled him to establish this position in a manner as satisfactory as unexpected: During the winter of 1890-1891 he made a vertical and median section upon the previously-frozen cadaver of a virgin 28 years old. Upon section the uterus was greatly retroverted, and it would probably have come into contact with the sacrum had not the colon, distended by stercoraceous matter, interposed between its posterior surface and the rectum. In front of the uterus, and directly against its anterior wall, were four intestinal loops filled with faecal matter. These thin loops filled the vesico-uterine *cul-de-sac*, which, through this fact, was represented by an angle with an opening of ninety-five degrees. After having made a tracing of the section, the author placed the latter, still frozen, in a rectangular, flat-bottomed basin filled with alcohol. Three days later, when he wished to take the piece to study in detail, he was much surprised to find that the uterus had completely changed its position, and this spontaneously, for no one had touched the section since it had been placed in the alcohol. What had occurred was as follows: The intestinal loops, filled with faecal matter, which filled up the vesico-uterine *cul-de-sac*, having become freed after the frozen condition had passed off, had ascended to the surface of the liquid. The uterus, in turn, relieved of the contact of this abnormal mass which had held it pushed back, had gradually inclined toward the bladder, and had of itself, without any outside intervention, taken such a position that its greatest axis—now oblique from above downward and from the front backward—was parallel to the axis of the excavation. This new position, taken by the uterus itself when the intestinal loops no longer exerted any influence upon it, the author considers to be the normal position of the organ.

O. M. Doyle <sup>61</sup><sub>Nov. 18, '93</sub> cites a case which was at first believed to be one of simple imperforation of the hymen, but in which the uterus was found to be entirely absent. Machenhauer <sup>317</sup><sub>No. 38, '93</sub> <sup>2</sup><sub>Dec. 18</sub> reports the case of a young woman, 22 years old, whose external genital organs were normal and in whom the upper portion of the vagina divided in two portions, each leading into a well-developed neck. Each orifice of the neck was open, the two being united internally. The uterus was very large, its fundus divided into two cornua; a sound could be inserted into each

uterine cavity. Kelly <sup>764</sup><sub>Nov., '93</sub> gives the case of a woman, 30 years old, whose internal genital organs were removed by operation. The external genital organs were normal, but the vagina formed a blind tube measuring barely half an inch behind the hymen. The uterus was represented by two small solid nodules, one situated upon the median line and the other about two inches to the left. The tubes were well developed, the ovaries small; a fibrous band united the two uteri. A. Goujet <sup>7</sup><sub>No. 1, '94</sub> reports a case of unicervical bicornate uterus, the left uterine body being more developed than the other and the neck not divided by a septum. Weinlechner <sup>22</sup><sub>Jan. 10, '94</sub> describes the case of a woman, 28 years old, with a double vagina and a double uterus, of the normal length on the left side, smaller on the right,—where its length was only two centimetres. The two halves of the uterus were closely united in their central portion, while in the vagina and the fundus the two sections turned outward. The left tube was thick and led to a greatly hypertrophied ovary. The right appendage was normal. The author cites three cases of malformation more or less resembling this, in one of which the two cornua of the uterus became gravid at different periods. He has, besides, seen a case complicated by atresia and a case in a newborn infant.

Marchand <sup>1</sup><sub>Sept. 1, '94</sub> reports a case in which a foetus presented, in the region of the symphysis, a sac resembling a scrotum, without any external opening. Further examination revealed the fact that the foetus was of the female sex; the uterus was bicornate, attached to a long, rounded sac situated above the pelvis, and having no communication with the external portions. This sac contained a mass formed of epithelial cells rich in glycogen. The bladder, very small, was located to the left of the sac, and was provided with two short blind pockets representing the ureters; there were no kidneys. The upper portion of the large intestine formed a sac which was distended by the meconium.

Bué <sup>2</sup><sub>Sept. 30, '93</sub> cites a case in which a woman, at term, felt a swelling extending outward and upward from each kidney, toward the anterior border of the axilla. One of these swellings, the right, was separated from the breast by a groove or furrow. When the child was nursing at the right breast, a diminution of this swelling was noticeable, but it afterward regained its former volume; this continued until the end of the period of nursing. There was no



trace of a nipple; the skin covered large veins as in the normal breast. The prominence on the left side was much smaller and disappeared in one day. L. E. Dionne<sup>1</sup><sub>Dec. 23, '93</sub> reports two cases of supernumerary nipples. In the first, a well-developed, young German girl had a nipple in the right axilla; in the second, a young woman, 32 years old, had a nipple situated two and one-half inches to the right of the right nipple, which was normally developed. This young woman had a well-formed, healthy child; the lacteal secretion only appeared through the normal nipples. The author does not agree with Darwin in considering the presence of supernumerary breasts as atavic; he believes that it is a teratological phenomenon, which may be explained by the production, in excess, of a group of wandering cells, which, although separated from their cogenerates of the normal breast, nevertheless continue their development. J. Neish,<sup>2</sup><sub>Dec. 30, '93</sub> in referring to the communication of Bué, remarks that this case seems to support the opinion of Meckel de Hernsbach, who admits a great analogy between the arrangement of the breasts in the woman and in the bat. In the embryo of the latter there are five breasts,—two thoracic, two axillary, and one situated above the umbilicus below the sternum. According to Winckel, Gorré saw a woman having five breasts thus situated; Bué's case is identical, with the exception of absence of the suprmedian umbilical breast. F. C. Coley<sup>6</sup><sub>June 10, '94</sub> met with a case in which there were two symmetrical supernumerary breasts situated above and inside the normal ones. In another case a symmetrical supernumerary pair were found below and outside the normal pair. It would, therefore, seem that there is in man a tendency toward the formation of two rows of breasts as in quadrupeds, and that these two rows converge backward. Hall<sup>824</sup><sub>Apr., '94</sub> reports a case of supernumerary breast observed in a woman 40 years old; it was situated four inches above the left nipple, four inches to the left of the median line, and secreted milk during the period of lactation. Dalziel<sup>90</sup><sub>Aug., '94</sub> had occasion to observe a child of 2 months having somewhat large mammary glands, which daily became engorged with milk and caused fits of screaming. The mother thereupon applied poultices and fomentations; milk was freely discharged and some relief obtained. All the four male children of this family had suffered in the same way for a few months after birth. The only daughter

had not been so affected. Shaw<sup>161</sup><sub>Oct., '93</sub> saw, in a young woman of 19 years, probably in the region of the hollow of the axilla (the situation is not at all clearly indicated), two supernumerary mammary glands,—one on the right, one on the left. The one on the left resembled a wart; that on the right, much more developed, was of the size of a strawberry. The two glands were congenital; that of the right side had developed at the age of 13 years, and during pregnancy had grown to the size of a finger-nail. Pick<sup>1</sup><sub>Oct. 28, '93</sub> reports a case of double supernumerary nipples in a woman of 33 years. Situated between the normal nipple and the axilla, the left supernumerary nipple had a normal development and secreted milk during the period of lactation.

## MALFORMATIONS.

*Extremities.*—Mary McCay Wenck<sup>1098</sup><sub>Dec., '93</sub> saw a child, several weeks old, which had two thumbs on the left hand, the second one being inserted upon the external side of the second joint of the first; all the other fingers were normal and well proportioned. Souques and Leclerc<sup>452</sup><sub>July, Aug., '94</sub> report the case of a woman, 60 years old, whose left hand had only a thumb and little finger; the index and the medius were entirely absent, their metacarpal bones, however, existing. The third finger had a rudimentary first phalanx. The phalanges of the two existing fingers were united; there were no traces of cicatrices in the region of the missing fingers. The authors consider this case as due to an intra-uterine amputation. Delthil<sup>24</sup><sub>Feb. 18, '94</sub> saw a little girl of 4 years on whose right hand the medius was absent, being merely represented by a very thin rudimentary first and second phalanx and sheathed upon the index, forcing the latter in the direction of the thumb. On the left hand there was also a rudimentary phalanx starting from the head of the metacarpus of the middle finger and inserted into the third finger. This malformation is interesting owing to its symmetry. No hereditary antecedents were noted.

A. Jacobi<sup>51</sup><sub>Nov., '93</sub> relates the case of a child, 7 years old, with a deformity of the right hand. The fourth finger was normal; the second and third were united along the length of the first phalanx. Between the first finger and the thumb there was a supplementary finger which, though this was difficult to determine, appeared to be principally attached to the thumb. Albers<sup>4</sup><sub>Sept. 3, '94</sub> describes the

following malformations which he ascribes to amniotic adhesions: On the left hand the third and fourth fingers were joined, and were operated upon. On the right hand the index and the third phalanx of the third finger were absent; the middle and the little fingers presented a deep groove at the same level,—a trace of the cause of the amputation of the phalanx of the ring finger. On the left foot the third phalanges of the great and the fourth toe were absent; the two proximal phalanges of the second and third toe were united. On the right side there was a deep furrow below the calf of the leg; in the foot, absence of the third phalanx of the second and third toes, which were partially joined.

Tubby <sup>6</sup><sub>Feb. 17, '94</sub>; <sup>1</sup><sub>Sept. 1</sub> gives an account of the following case: The feet were symmetrical; the second, third, and fourth toes were missing. The fifth toe was larger than usual, and the great toe was well developed, but deprived of a nail, and could be brought in apposition with the other. On the hands only the little finger existed. This deformity persisted during four generations. The ancestors were well formed; of 22 descendants 13 had the great toe in apposition with the fifth, the others being missing; 1 had only a single toe on each foot; 1 had one toe on the left foot and two on the right foot. The parents were not consanguineous.

Guinard <sup>162</sup><sub>Oct. 25, '93</sub> describes a fœtus with harelip, absence of the epiglottis, penis, etc; there were seven webbed fingers on each of the hands and seven toes on each of the feet. Vaughan Pendred reports <sup>6</sup><sub>July 21, '94</sub> the case of a newly-born male infant in which the metatarsal bones and the phalanges of the two external toes were missing on both feet. The second and third toes of the left foot were unevenly developed. Donald Macphail <sup>213</sup><sub>Feb., '94</sub> saw a little girl, 6 months old, presenting the following malformations: The thumb of the right hand was formed by a large proximal phalanx with two small distal phalanges placed parallel to each other, each furnished with a nail; they were webbed. The proximal phalanx contained two bones, which articulated, one with each of the distal phalanges. On the left hand the two distal phalanges, which were likewise present on the thumb, were separated by about forty-five degrees, and only the external one was articulated with the proximal phalanx, the internal one being merely united with the external distal phalanx. The maternal grandmother of the child had had a supplementary thumb (removed by a surgeon) and a

paternal uncle of this grandmother had six toes on each foot. Delthil, <sup>14</sup><sub>Feb. 4, '94</sub> referring to a case of symmetrical ectrodactylia of both middle fingers, is of the opinion that ectrodactylia is merely a more rudimentary syndactylia.

Vergely <sup>188</sup><sub>Feb. 25, '94</sub> reports a case of brachydactylia observed in a man 60 years old. The anomaly existed on both hands and feet and presented the following appearance: there was a normal first phalanx, articulated at its distal extremity with a second phalanx, which was terminal and provided with a perfectly-formed nail. This malformation was hereditary and had existed in the father of the subject described and in two of his three children. Delamare <sup>996</sup><sub>Feb. 25, '94</sub> reports a very interesting case of polydactylia, which was hereditary, the malformation having existed through three generations.

Beco and Firket <sup>293</sup><sub>p. 169, '94</sub> describe a case of polydactylia observed in a child of 9 years, a native of Central Congo. The authors state that this condition is relatively frequent in this region. It is also met with among the population of Lower Congo and along the upper river, although more seldom.

Dunlap <sup>36</sup><sub>Dec. 20, '93</sub> exhibited three patients showing how strong the heredity of deformity can be. T. S. had his ring and middle fingers of the left hand webbed; his son had an exactly similar deformity, and his grandchild, the child of the second patient shown, had the ring and middle fingers of both hands webbed and also three toes on both feet webbed. These cases showed a deformity transmitted directly to two generations. Bourneville <sup>73</sup><sub>Oct. 28, '93</sub> describes an individual, 39 years old, whose lower extremities present the following appearance: The thigh terminates below in a sort of pestle; the leg, after its articulation with this pestle, turns upward and places itself in the angle formed by the two thighs. The feet, with the soles juxtaposed, are close to the penis. There appears to be only one bone in the fibula. The calcaneum seems very irregular, also the bones of the tarsus; the metatarsal bones and the toes are normal.

Krönig <sup>317</sup><sub>Feb. 17, '94</sub> exhibited before the Leipzig Obstetrical Society a child, aged 14 days, with congenital absence of the radii. There was a moderate amount of hydrocephalus, but no other disease or deformity beyond the forearm. The most remarkable feature in the case was the presence of the thumbs and the perfect develop-



ment of the hands. The supinator longus was powerfully developed and inserted into the middle of the ulna. The carpal bones seemed to be perfect. Beatson<sup>213</sup><sub>May, '94</sub> showed to the Glasgow Pathological and Clinical Society a case of congenital club-hand in a female child 3 years of age, the deformity being due to the absence of the right radius. The thumb of the hand was also absent. At birth the hand was folded up on the forearm very closely, and the only movement noticed was in the little finger. It was observed, too, that, of the four fingers, the two outer ones were webbed. No instances of deformity of hands or feet could be traced in the family history. The child has been healthy in all other respects, and nothing has been done for the deformity. The mother has noticed that, with the child's growth, the hand has been coming more away from the arm, and the child can now not only flex the fingers, but can also grasp objects with them. There is, however, no power of flexion at the elbow-joint. The humeri are equal in length. The case undoubtedly belongs to that group where the club-hand arises from osseous defects, the bones of the forearm, wrist, and hand being incomplete.

Young<sup>1</sup><sub>Sept., '94</sub> found, in a youth 16 years of age, the sternal origin of the pectoralis major of the left side to be quite absent. The patient stated that his chest had always been in that condition and that there was no weakness on that side. The clavicular portion was not developed as well on the left side as on the right, but the left deltoid was the more developed. The only other malformation was partial webbing of the fore- and middle fingers of the left hand.

R. Buchanan<sup>1</sup><sub>May 6, '94</sub> describes the following case: Young boy 14½ years old; weighs sixty-eight pounds; measures three feet and two inches. The humerus is normal on both sides. The right arm appears to have been subjected to an intra-uterine amputation of the radio-carpian articulation. On the left the bones of the carpus are imperfectly developed; there are only two metacarpal bones,—that of the thumb and that of the index. The thumb has no phalanx, but there is a well-developed nail on the head of the metacarpal bone. The index has a phalanx without a nail. The right femur, shorter than the left, is attached at a right angle to the pelvis. The left foot is well developed with the exception of the great toe, which is larger than usual. The bones of the tarsus

are imperfectly formed in the right foot, which presents a varus. The left testicle has descended, the right being absent.

*Head.*—J. Arnold <sup>13</sup><sub>Apr. 15, '94</sub> made a detailed anatomical examination of an hemicephalic infant, 3 days old, which he had seen during its life-time, when it was able to nurse and swallow and seldom cried. The urine and the meconium were normally excreted; the pupils did not react. The reflexes were augmented; irritation of the surface of the rudimentary brain gave rise to muscular contractions. The brain presented an exaggerated dilatation and a malformation of the ventricles, of which the prolongations were covered with a thick epithelium; the presence of nerve-elements could not be demonstrated with certainty. The pyramids were almost, if not entirely, absent. As is often the case, there were simultaneous atrophy of the suprarenal capsule and malformation of the genito-urinary apparatus (hypospadias, unilateral testicular atrophy). The sympathetic was normal.

H. Hochaus <sup>6</sup><sub>Jan. 6, '94</sub> describes the case of a child of 2 years, well developed physically, but greatly deficient intellectually. It was unable to speak, to stand upright, to walk, or to sit down, although movement of the arms and legs was possible. The child died in consequence of a severe burn. At the autopsy it was found that there was a complete absence of the corpus callosum, general hypertrophy of the brain, an unusual number of circumvolutions, and characteristic alterations in the grooves of the median surface of the hemispheres. The psalterium, the anterior and middle commissures, and the nerves of Lancisi were absent. The ventricles, especially the fifth, were greatly developed.

H. H. Clutton <sup>2</sup><sub>Oct. 21, '93</sub> gives an account of a woman with a congenital cicatrix on the left side of the chin and a corresponding diminution of the size of the lower maxillary. The alveolar border and the lip were normally developed; there was also a cleft on the upper lip on the opposite side.

W. N. Guilford <sup>547</sup><sub>Nov., '93</sub> cites the case of a man, 48 years old, and in good health, who had never had any teeth; his mouth had the appearance of that of an old man who had long since lost his teeth. There was no down on the skin, but there was hair in the axilla and over the pubis. He had a beard and hair on the head. He seemed to be absolutely deprived of sudoriparous glands, as he never perspired even during the most intense heat. His maternal

grandmother had neither teeth nor hair; among his eight children several had certain teeth missing.

*Viscera.*—Launay<sup>7</sup><sub>No.9,'94</sub> observed, in a woman suffering from cancer of the pancreas, an isolated inversion of the organs of the anterior and posterior mesogastrium. All the intestinal loops, with the exception of the duodenum, were in place; the stomach was situated in the right hypochondrium, turning its smallest bend to the left and its large tuberosity and largest bend to the right. The small bend was directed somewhat obliquely downward to the left and backward, and found its continuation in the commencement of the duodenum. The latter crossed the vertebral column from right to left, and, reaching the left side of the tenth dorsal, deviated in a downward direction and continued, after a short course with the jejunum; there was thus neither a third nor a fourth portion of the duodenum. The end of the biliary tract was, like the stomach, completely inverted. The umbilical vein reached the liver in the normal manner, to the right of the vesicle. The pancreas, likewise, had its head to the right and its tail to the left. The spleen, which was double, was located in the right hypochondrium, behind and to the outside of the large tuberosity of the stomach. The author minutely describes the three branches of the cardiac trunk, the upper mesenteric artery and the renal arteries (which, contrary to the normal, passed in front of the veins), and the portal vein. He refers to the analogous case published by Deboire.<sup>7</sup><sub>'57</sub>

A. S. Warthin<sup>1</sup><sub>Mar.10,'94</sub> reports the case of a man, 51 years old, who, upon auscultation, presented the characteristics of inversion of the viscera. H. J. Herrick<sup>59</sup><sub>July 28,'94</sub> describes the condition of a workman in whom the heart was normal, but located on the right side, with its lowest point in the fifth intercostal space, about one inch from the nipple. The liver, also normal, was on the left, and the stomach on the right, side.

Franklin Dexter<sup>99</sup><sub>Nov.9,'93</sub> met with the following anomaly during an autopsy: The common iliac was located in the right iliac fossa, with its mesentery fixed upon the right iliac artery. The cæcum, the appendix, the ascending and the transverse colons were in their normal position, but the descending colon crossed the aorta in the region of the third lumbar and extended toward the right. The left iliac fossa was occupied by the loops of the smaller intes-

tine. P. Tichow <sup>852</sup><sub>V.3, No.4; Dec.23, '93</sub> <sup>21</sup> observed an umbilical tumor consisting of two portions; the largest had a central canal ending in a *cul-de-sac*, and presented all the histological characteristics of the smaller intestine; this was the non-obiterated ductus omphalo-mesentericus. At its base there was a small, round tumor the surface of which was covered with tubular glands; the interior consisted of connective tissue and smooth muscular fibres. The author considers that the latter is a portion of the intestinal mucous membrane.

Lardenois <sup>7</sup><sub>No.8, '94</sub> communicated to the Anatomical Society of Paris a new example of Meckel's diverticulum. It was detached from the ileum at a distance of about forty-five centimetres from the ileo-cæcal isthmus, and was implanted (contrary to the usual manner) upon one of the lateral surfaces of the intestine near the concave border of the intestine, instead of upon its convex edge. It was not free and movable, but was attached to the surface of the mesentery, throughout its entire length, by a mesodiverticulum. Its length was about ten centimetres and its shape resembled that of a letter L. Its calibre, about half that of the intestine, was very irregular. It terminated, at its distal extremity, by a sort of *cul-de-sac*, distended in club-shape, but irregularly convex and covered with bosses. This *cul-de-sac* presented no prolongations, and there were no traces of the omphalo-mesenteric vessels, as observed in many cases.

Gennet <sup>7</sup><sub>No.11, '94</sub> reports a case of Meckel's diverticulum observed by him in a woman, 54 years of age, who died of cancer of the generative organs. This diverticulum, shaped like the finger of a glove, was detached from the convex edge of the ileum, 1.35 metres distant from the ileo-cæcal valve, measured 9 centimetres in length, and was freely movable in the abdominal cavity. It was cylindrical in form, opening into the intestine by an enlarged base and terminating at its opposite extremity by a regularly rounded *cul-de-sac*. Its calibre, which was quite regular, was exactly that of the intestine itself.

*Genito-urinary Organs.*—J. B. McGee <sup>222</sup><sub>Jan., '94</sub> reports the case of a child, 1 month old, having a normal scrotum in which the presence of a testicle was easily recognizable on the right side, while on the left there was none. The left testicle was situated in the perineum; the fact that it was provided with a cremaster was



made evident by the displacements caused by slight irritation applied to the skin. In a second case there was a supposed supernumerary testicle. This gland was in the left half of the scrotum, and presented the form of a smooth, oval body, about one-third the size of the testicle next to it. This body was situated below the epididymis and appeared to be attached to the deferent canal; it was apparently of congenital origin. A. Faidherbe <sup>220</sup><sub>Jan. 6, '94</sub> describes the case of a female, 20 years old, who had never menstruated. The external genital organs were well developed, the hymenal orifice narrow, leading into a small cavity about one centimetre deep, which represented all that existed of the vagina. There was no uterus. The body presented a strictly feminine character. Garson <sup>2</sup><sub>Feb. 10, '94</sub> describes certain operations practiced upon the genital organs by the Australians. Certain men, in order to prevent procreation, are subjected to circumcision and artificial hypospadias, the name "mika" being given them after the operation. With the same object in view, certain females undergo, at the age of 10 or 12 years, a complicated operation in which the vaginal portion of the neck of the uterus is removed and an artificial opening is made, the perineum being severed behind the anus. These women are called "eriltha."

H. von Bergmann <sup>41</sup><sub>Mar. 19, '94</sub> reports the case of a child, considered as a girl, presented at his clinic for treatment of cystitis. There was a scarcely developed penis, curved backward, with an imperforate glans. There were no traces of a scrotum or of labia majora; no testicles, these being either intra-abdominal or entirely absent. The urethra, which was large and funnel shaped, had caused the parents' mistake.

Edgar Willett <sup>2</sup><sub>Feb. 10, '94</sub> presented specimens taken from an individual who had died of cerebral hæmorrhage at the age of 44. The penis was well developed and the scrotum contained a vaginal tunic on each side. In place of the ovaries there were two testicles (microscopical examination) provided with deferent canals, the termination of which in the prostatic urethra was not clear. The vagina perforated the prostate and opened as the uterus masculinus usually does. It was well developed, with closed tubes. From the history of this person it appears that he had been married, two children resulting.

Binaud and Bousquet <sup>188</sup><sub>June 17, '94</sub> describe a case of perineo-scrotal

hypospadias accompanied by cryptorchidia. The subject, 18 years old, up to that time considered as a girl, presented a penis about four centimetres long, with a lax prepuce and a nearly normal, but imperforate, glans. There was no vulvar orifice, but two folds analogous to the labia majora, and between them, at the root of the penis, an opening through which the urine was voided. In the region of the inguinal canal a body was felt, painful upon pressure,—possibly a testicle,—but there was no similar condition on the left side. Rectal palpation did not reveal either prostate or uterus. The hair was long, but there was none over the pubis, while the pelvis was masculine in character. A. Kurz<sup>69</sup><sub>Oct. 5, '03</sub> gives an account of a subject, 28 years old, who exhibited himself in Italy as a freak and who presented the following peculiarities: Short stature,—1.37 metres,—but well-proportioned; seen from the front the body presented a masculine appearance (beard and moustache, prominent larynx, no breasts, abundant hair over the pubis reaching up to the navel); seen from behind he presented more particularly a feminine aspect (long hair, round shoulders, prominent buttocks). In the place of a clitoris there was a penis of from four and one-half to five centimetres in length (in a state of erection, eight centimetres), having a thickness of two and one-half centimetres, and furnished with an imperforate glans. Below this there were well-developed female sexual organs, with a narrow vagina and short uterus. The subject indulged in sexual intercourse either as a man or a woman, without any preference on his part for either mode. According to his exhibitor, he had been pregnant and aborted. The left ovary was present, but the right could not be found. No testicles. In the absence of rectal palpation no complete examination could be made, but it is probable that the case in question was one of external female pseudohermaphroditism. C. Martin<sup>48</sup><sub>May, '94</sub> describes a subject, 20 years old, considered as a female. No moustache and no beard; breasts but little developed; well-formed mons veneris; no hair over the pubis; external genital organs resembling those of a multipara; well-developed labia majora and minora; clitoris normal; the vagina represented by a *cul-de-sac* three-fourths of an inch deep; no uterus. The person presented herself for the examination of a painful tumor of the left groin, which it was decided to remove. This tumor proved to be a testicle surrounded by a vaginal tunic.

Microscopical examination revealed seminal vesicles and even imperfect spermatozoa. One year before she had been successfully treated for an inguinal hernia of the right side. A solid oval body then found in the sac, and regarded as an ovary, had been pushed back into the peritoneal cavity. The sister of the subject, 22 years old, has never menstruated and has infantile breasts; no hair over the pubis; the vagina is merely represented by a *cul-de-sac* an inch long; no trace of uterus. Roussel<sup>228</sup><sub>Sept. 15, '94</sub> describes a child of 7 years with no vulvar orifice; the two large folds simulating the labia majora are merely empty sacs,—the two halves of a scrotum without testicles, either in the interior or in the ring; small penis, turned backward; perforate glans, the orifice merely leading into a very short *cul-de-sac*. Urethral orifice behind the root of the penis.

## NORMAL HISTOLOGY AND MICROSCOPICAL TECHNOLOGY.

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*Nervous System.*—The Croonian Lecture before the Royal Society <sup>2</sup><sub>MAR. 10, '94</sub> gave Ramón y Cajal, of Madrid, an opportunity to describe the main results of his investigations during the last five years. As regards the nervous system at large, these investigations had warranted the conclusions (1) that there was an interstitial nervous net-work, (2) that a distinction should be made between sensory and motor cells, and (3) that protoplasmic prolongations were nutritive. It will be remembered that this author has brought prominently forward and extended the doctrine of Golgi, that, with very few exceptions, every nerve-cell possesses not only a process of Deiters, or cylinder-axis prolongation, but also protoplasmic processes; so that each nerve-cell appears to be a minute reflex apparatus having centripetal, or cellulipetal, and centrifugal, or cellulifugal, processes, the former being represented by the protoplasmic processes and the latter by the process of Deiters, both of which possess numerous collateral and terminal fibrils. The transmission of impulses in the gray substance is effected not by the direct continuity of the centripetal fibrils of neighboring cells, but by contact, or contiguity, or apposition of the processes of one cell with those of another. The main function of the cell is of a trophic nature, and the real generation of nerve-force will, perhaps, hereafter be proved to take place in the wonderful plexus formed by the ramification of the cell-processes.

In closing his lecture Ramón y Cajal ventured to suggest an hypothesis which he thought would enable us, better than any other which had been put forward, to understand intellectual development produced by a well-directed mental education, inherited mental excellencies, special professional adaptations, and the formation of artistic aptitude. "Cerebral gymnastics" could



not, he thought, improve the organization of the brain by increasing the number of cells, for, as had been fully established, the nerve-elements lost their power of proliferating after the embryonic period. But it may be admitted to be very probable that mental exercise stimulates, in those regions of the brain which are most exercised, a greater development of the protoplasmic apparatus and of the system of collateral nervous paths. In this way associations already in existence between certain groups of cells would be notably re-inforced by means of the multiplication of the minute terminal branches of the protoplasmic expansions and of the collateral nervous paths. Further, absolutely new intercellular connections might be established by the formation of new collateral connections and protoplasmic expansions. But how can the volume of the brain be maintained unaltered if there is a multiplication and even a new formation of the terminal branches of the protoplasmic appendices and of the collateral nervous connection? There is nothing to prevent our supposing either a correlative diminution of the cell-bodies or a proportional shrinking of those parts of the brain whose functions are not directly related to the exercise of the intelligence. We may thus explain family talent by supposing an hereditary transmission to the immediate or, by atavism, to the more distant descendants of this superior organization of the connections of the pyramidal cells. Many other deductions are permissible. Thus, in the case of those men, of whom an example is furnished by Gambetta, in whom talent is coincident with a brain of small size, the nerve-cells would be less numerous, or perhaps simply smaller, but, on the other hand, they would present a very complicated system of protoplasmico-nervous associations. On the other hand, the excessively large brain, so often associated with inferior intelligence or even with imbecility, would contain a greater number of cells, but the connections between them would be very imperfect. This is, perhaps, the case in the large brains of the whale and of the elephant.

This anatomico-physiological hypothesis is not original in principle, for physiologists and psychologists have already looked for the anatomical characteristic of intellect in the richness of the cellular association; but it possesses this new point: that it is based upon actual facts of structure, and not upon pure suppositions with regard to the actions and the associations of the nerve-

cells. Compared with the theory of net-works, that of the free branching of cellular expansions capable of growth appears not only more probable, but also more encouraging. A continuous net-work, pre-established,—a sort of fixed telegraphic grill-work into which it would not be possible to introduce either new stations or new lines,—it is a thing so rigid, so immutable, so unmodifiable, that it does violence to the feeling which we all have that the organ of thought is, within certain limits, plastic and susceptible of being improved, especially during the period of its development, by well-directed “mental gymnastics.” In support of his conception he compares the cerebral cortex to a garden full of innumerable trees,—the pyramidal cells,—which, in response to intelligent cultivation, can increase the number of their branches, strike their roots over a wider area, and produce evermore varied and more exquisite flowers and fruits.

“For the rest,” he says, “I am far from believing that the hypothesis which I have just sketched out, taken alone, can explain the great quantitative and qualitative differences which cerebral action presents among different animals and in the same animal species. The morphology of the pyramidal cell is but one of the anatomical conditions of thought. Now, this special morphology will never suffice to explain to us the enormous differences which exist, from the functional point of view, between the pyramidal cell of a rabbit and that of a man, any more than between the pyramidal cell of the cerebral cortex and the stellate cells of the cord or the great sympathetic. Also, in my opinion, it is very probable that, besides the complexity of their relations, the pyramidal cells possess an intra-protoplasmic structure which is peculiar to them, and which, in intellects of the higher order, is still more elaborate,—a structure which does not exist in the corpuscles of the cord or of the ganglion.”

Ramón y Cajal, <sup>59</sup><sub>Feb. 3, '04</sub> also studied the structure of the sympathetic ganglia and reached the following conclusions: 1. The visceral ganglia are constituted by the multipolar cells, the expansions of which, after many ramifications, pass into the plexus which terminates in muscular fibre or glandular cells. 2. All ganglia possess fibres of prolongation, which continue, perhaps, with the fibres of the grand sympathetic; and, likewise, collaterals, which terminate in nerve-cells. 3. Chiasma represent not alone

a point of intercrossing, but also a point of bifurcation for the nerve-fibre prolongations and for the expansion of visceral ganglionic cells. 4. There exists no anastomosis between the cells of the visceral ganglion, nor between prolongation fibres, nor between the collaterals. The same probably holds for the interstitial cells.

According to Golgi, <sup>409</sup><sub>V.19,p.454</sub> there is a certain group of rounded or pyriform cellules with a single prolongation, which many anatomists attribute to the descending root of the fifth pair, but which should rather be attributed to the pathetic nerve. They do not correspond to the type of common nerve-cells, but rather to those of the intervertebral ganglia, the glosso-pharyngeal ganglion, and the ganglia of Gasser. The fibro-nervous prolongation sends out collateral fibrils, which form the valve of Vieussens. Relatively to the nervous theory of dynamic polarization, according to which all the nervous prolongations are cellulifugal, these cellules are an enigma.

Rouget, <sup>920</sup><sub>Dec.4,'93</sub> by means of a solution of methylene-blue acting on muscles taken from the living animal, ascertained the growth in diameter of the terminal ramifications of the cylinder-axis immediately after passing the sarcolemma. This appearance is not, by any means, due to a thickening of the nervous filament itself, but to a special zigzag disposition, the filament rolling about itself in a solenoid form, the turns becoming closer as the terminal extremity is approached. The latter swells out in the form of the segment of a sphere or a truncated cone, the cylinder-axis being rolled about itself. This folding process is often interrupted by intersections in which the axial filament appears, with its diameter, true or slightly deflected, to again twist about itself, giving, to the terminal ramification and its branches, the aspect of a rosary, each bead being formed by a rolled portion. Sometimes a nervous termination, which seems, at first, to consist of a single branch or two branches, is, in reality, formed by an axial filament, not single, but double, the twin filaments being in direct juxtaposition, but separating in places, causing oval or lozenge-like shapes; in this case the two filaments unite in an arch at the terminal extremity.

Clara Weiss <sup>B.135,H.2</sup> shows that in the dog there are pale and tumefied cellules in the intra-fascicular connective tissue of the peripheral nerves in the dog, corresponding to those observed by

Renaut in the horse and ass. They were at first attributed to thyroidectomy, but have since been observed in normal dogs.

Fusari <sup>409</sup><sub>v.20, Nos. 2, 3</sub> studied the epithelial nerve-termination and confirms the statement that the tactile cells of Langherans and Merkel are not nervous, and do not stain by Golgi's method. In the nasal mucous membrane the fibres of the submucous plexus of the vestibule partly terminate in nerve-cells of varying size, analogous to those of the calciform and fungiform papillæ of Panasci and Fusari. The tortuous and varicose fibrils which originate from them dichotomize under the epithelium or its deep layers and terminate in the epithelium. In the respiratory region the intra-epithelial fibres divide, by dichotomy, in the deeper portions of the epithelium, the vertical fibres reaching the free surface, the horizontal ones forming plexuses with their neighbors, without marked continuity or contiguity. They present thick nodosities, some of which may be cells, though the author was unable to stain the nucleus. In the olfactory region he was able to confirm the description of Cajal, according to whom the basal prolongations do not divide, each nerve-fibre coming from a single olfactory cell, while the olfactory nerves, in the region intermediate between the respiratory region, do not send ramifications into the epithelium. Fusari regards these latter as ethmoidal nerves, their fibres being coarser than those of the olfactory nerves. In Jacobson's organ several fibres are in relation, under the epithelium, with nerve-cells which send thin prolongations into the epithelium. In the laryngeal mucus Golgi's method enabled him to discern intra-epithelial fibres, which, originating in the subepithelial plexus, and principally from its cells, dichotomize at right angles, forming little bunches which reach the free surface. In the organ of hearing the author ascertained the continuity of nerve-fibres with the epithelial cells of the acoustic crests and of the epithelial extremity of the cochlear canal, thus placing in doubt the statements of Retzius and Van Gehuchten. His experiments were made by Golgi's method on the *Mus decumans* and the dog and upon new-born dogs and cats.

Cerebro-Spinal System.—Berkley, of Baltimore, <sup>858</sup><sub>v.4, Nos. 4, 5, '04; Dec. 22</sub> studied the pituitary body and its nerve-elements with the aid of Golgi's method, using the hypophysis of the adult dog. The nerve-fibres entering the anterior or glandular lobe can be seen



passing into the glandular substance in company with the blood-vessels; these fibres ultimately divide into fibrils, which end in free bulb-like points abutting against the glandular follicles exactly as in other secreting gland-structures, the whole arrangement being very similar to the adrenal gland. No nerve-cells are to be found in the substance of the anterior lobe. The posterior lobe contains both nerve-cell elements and other (ependymal) structures, which are remarkably shown by the Golgi method. Interspersed with these are a few glandular follicles, which, the author thinks, are offshoots from the anterior lobe and derived from the same parent buccal epithelium. The epithelial cells which remain (unmodified) in the posterior lobe are at the periphery in a layer, about three or four deep and nearly continuous all round,—apparently an inclosing sustentacular structure supporting the nerve-elements proper, which are lodged within. These latter comprised scattered cells, some of spindle form, as shown by Andriezen by the use of the Golgi method, while others are rounded and pear-shaped or irregular in outline. Toward the mid-region of the lobe three fusiform nerve-cells form a group, which is especially distinct behind the position of the infundibular duct. The author also confirms the conclusions of Andriezen, “that the pituitary in amphioxus and ammocoetes is of threefold structure, namely, a subneural glandular organ; a duct lined by ciliated epithelium, which affords a communication between the buccal and neural cavities; and a group of nerve-cells around and at the back of the upper opening where the duct widens into the ventricular cavity,” and adds the curious confirmation that essentially the same structures should be preserved in so high a vertebrate as the dog. With the Golgi method the author finds the presence of both the stellate and the mossy types of neuroglia-cells, while he finds the fusiform nerve-cells have processes which, through a connection with the peculiar neuro-epithelial cells (on the periphery of the duct and posterior lobe), had at one time the function of testing the water entering the infundibular canal. Indeed, their peripheral expansions are not unlike those of the mitral cells in the olfactory bulb, and suggest a similar function to the osphradial ganglia of molluscs, as was pointed out by Andriezen. The author also gives grounds for recognizing the distinction between these sensitive elements and the secretory

fibres, and concludes that in one of the higher vertebrates (the dog), at any rate, the pituitary gland retains its twofold rôle: the secretory rôle, perhaps modified, but still active; the nervous (special sensitive) function lying quiescent, though still indicating their ancestral activity in their tuft-like terminations, which resemble the mitral cells of the olfactory bulbs. The author's researches go to confirm the importance of the pituitary body in the life-history of the vertebrate and to show its close connection, both as a secretory and a sensory stricture, with the central nervous system; while its connection with an oxygen-bearing water vascular stream passing through the nervous tube of ancestral vertebrata shows that its secretion has an important bearing on the metabolism and assimilation of oxygen by the brain and nervous system generally,—a conclusion with which the recent researches of Vassale and Sacchi agree.

D'Abundo <sup>589</sup><sub>June 24, '94</sub> <sup>90</sup><sub>Dec.</sub> has reported the results obtained by him during a series of observations upon the innervation of the cerebral dura mater, which is generally described as possessing a comparatively small supply of nerves. Careful employment of the Weigert-Pal method enabled the observer to demonstrate that the nerve-supply of the cerebral dura was very abundant, but he was not able to discover the ultimate terminations in the corpuscles of Vater which have been observed by Krause.

Luis, of Paris, <sup>55</sup><sub>Oct. 13, '94</sub> presents his conclusions regarding the arrangement of the fibres of the cerebro-olivary bundles, which he considers as more complicated than is usually supposed: 1. The one set, transversal, pass from one hemisphere to the other, forming the commissural system (corpus callosum and commissures). 2. The majority of the other fibres follow numerous directions; starting from all points of the cortical periphery, they form numerous systems, all convergent. Some wind themselves around the optic thalamus and are lost in its net-work; these form the cortico-thalamic systems. They are known separately under the name of the radiant crown of Reil in their median portion, of the internal capsule in their anterior portion, and of the fibres of Kölliker for their most posterior segment. Others lose themselves in the fibres of the striate body and yellow nucleus; these are the systems of cortico-striate fibres. 3. A third group of white fibres pass under the optic thalamus, and, confused up to this point

under the name of peduncular expansion, are lost in the various portions of the gray matter of the pons and medulla.

If the central nuclei receive an ascending contingent of fibres from the cord, the greater part of the cerebral white fibres converge like the radiations of a sphere toward their central nucleus, and all become lost in the central ganglia. The whole cortex, in other words, is connected by these fibres to the different portions of the axis.

Among these descending bundles of fibres there is one to which special attention is called. It is a bilateral bundle that descends with the white fibres. It passes behind the gray matter of the pons in a curvilinear direction, and thus reaches the extremity of each corresponding olivary body, to which it molds itself, forming a sort of capsule and finally losing its fibres in the convolutions of this body, to which it furnishes the afferent fibres. The olivary bodies of the medulla, like the opto-striate bodies of the cerebrum, are thus connected with the multiple elements of the cortex, and may therefore be called a conjugate system of strictly associated elements. As a proof of this, Luys recalls the fact that the olivary bodies are proportional as a mass not to the spinal cord, but to the cerebral lobes.

In 1859 he had already called attention to the fact that in the cords of the horse and the ox they appeared only as rudimentary, which was evidence that they are not connected as anatomical elements with the cord. In man they are at their maximum and are in proportion to the cerebral mass. The existence of the bundle described is, therefore, the confirmation of these mysterious relations hitherto unexplained.

Eight years ago Edinger <sup>2128</sup> <sup>1006</sup> <sub>May, '94; Sept., '94</sub> showed that in all vertebrates a thick bundle arises from the striatum, passes caudad to the thalamus, where a part ends in a large nidus, while the remainder extends still farther caudad. One bundle of the latter passes to the regio infundibuli; the course of the remainder was not determined. To solve this question three methods were employed, which gave him concordant results: (1) the study of serial sections of reptilian brains; (2) the section of the bundle in the pigeon and the subsequent study by Marchi's method, this study being supplemented by that of two of Goltz's dogs, one of which had lost the cerebrum, the other both the cerebrum and the

striatum of one side; (3) the study of a great number of Golgi preparations of reptilian brains to discover the character of the termini. In the alligator fibres from the striatum terminate in the thalamus in the following cell-clusters: (1) ganglion anterius thalami, characterized as the point of origin for Viq d'Azyr's bundle to the mammillaire; (2) the great nucleus of the thalamus, so prominent in all reptilian brains, and differently named by various authors; (3) the nucleus diffusus thalami, lying between the two former; (4) the nucleus medius (?). The corpus geniculatum laterale receives no such fibres. The Golgi method shows that these fibres break up, for the most part, into terminal brushes which envelop cells, though there is reason to believe that some fibres arise from cells in the thalamus and pass in the opposite direction. The experiments on the pigeon lead to the same general conclusions, as also do the dogs operated on by Goltz. From the study of the dog without cerebrum, but retaining the striata, Edinger concludes that the capsula interna consists of at least three kinds of fibres: (1) from the cortex to the thalamus; (2) from the cortex to the pons and pyramids; (3) from the caudate and lenticular nuclei to ganglia of the thalamus and mesencephalon. The latter can in no case be traced beyond the mesencephalon and are always of finer calibre than those of the two former classes. The fibres of the ansa lentiformis and those from the nucleus caudatus correspond to the basal prosencephalic bundle of the lower vertebrates. In the case of the dog, when deprived of both the cerebrum and the striatum, all of these fibres were degenerate.

The general conclusion is that the basal ganglion of vertebrates (in mammals, divided into nucleus caudatus and lentiformis) originates a strong fibre-system,—the basal prosencephalic bundle. This terminates in the ganglia of the mesencephalon only. The nuclei of the thalamus and of the regio subthalamica are, by means of these fibres, united most intimately with the cerebrum. No fibres pass from the basal ganglia farther caudad than the substantia nigra Sömmeringi. The name *Radiatio striothalamica* is proposed for this newly-discovered, but phylogenetically very ancient, fibre-system.

Azoulay <sup>14</sup><sub>Mar. 7, '94</sub> has studied the structure of the cerebellum in the child and observed certain peculiarities, the first of which was



the presence in the granular zone of star-shaped cells with short cylinder-axes, minutely divided and forming a net-work enveloping the grains and probably in contact with their protoplasmic ramifications. In infants of  $8\frac{1}{2}$  to 9 months, which had lived from eight to twenty-two days, there was an arborization of the ascending fibres in Purkinje's cells, forming very tight lace-work. E. Lugaro<sup>316</sup><sub>v.9, No.23</sub> states that the granular nature of the cerebellar cortex results from the gradual transformation of epithelioid elements into horizontal elements, then into vertical, and finally into grains. This transformation is accompanied by displacement of the body of the cell from the surface toward the centre. The author concludes, from his researches, that the position of a nerve-cell during embryonal life is not necessarily that which it will occupy definitely. The prolongation does not grow only from its extremity, but in its entire length, so as to permit of important displacements of the cellular body. While the nervous prolongations gradually but continuously diminish their relations in the adult, the protoplasmic prolongations may pass through various transitory forms, since the cellular protoplasm undergoes certain changes of form before acquiring its definite distribution.

A. D. Sorensen<sup>1006</sup><sub>Apr., '94</sub> presents what is doubtless the most complete comparative study and historical account of the epiphysis and roof of the diencephalon that has yet appeared.

*Lungs.*—H. J. Berkley, of Baltimore,<sup>858</sup><sub>v.4, Nos.4,5, '94</sub><sup>16</sup><sub>Feb., '95</sub> studied the distribution of nerves in the lungs by means of a modification of Golgi's method. Although a large number of animals were examined, the best results were obtained in the gray rat. The plexus of nerves around the bronchial arteries was found to be very extensive and much better developed than that around the bronchial tubes with which it freely communicates. Numerous fibres extend between the air-vesicles and supply, probably, scattered muscle-cells, as an epithelial ending could not be detected. In the bronchial tubes some of the fibres terminate by knobs on, not in, the muscular cells, and in the smaller tubes endings between the epithelial cells were seen. The arrangement of the ganglion-cells and of nodal enlargements on the fibres is also described.

*Heart.*—H. J. Berkley, of Baltimore,<sup>858</sup><sub>v.4, Nos.4,5, '94</sub> studied the intrinsic nerve-supply of the cardiac ventricles in certain vertebrates

by means of Golgi's method somewhat modified. The conclusions arrived at are given in the following propositions:—

“1. The interspaces of the muscular bundles of the heart of mammals, batrachians, amiurus, chelonians, and aves are thickly filled, from the apex of the ventricles to the auriculo-ventricular groove, by a dense net-work of coarser and finer anastomosing nerve-fibres, which touch, at some point, each bundle, but end-terminations are not always to be found in contact with every muscular cell.

“2. The terminal apparatus of the varicose net-works acting upon the muscular fibres is most frequently at the end of a short transverse ramus, arising in the course of a longitudinal fibre, and has always the aspect of a simple bulb of varying size.

“3. Neural enlargements of considerable diameter are found developed, in all the species of animals examined, upon the fibres of the intermuscular net-work. These neural swellings are probably nucleated. Transition forms, from the smallest varicosity on the thinnest nerve-fibre to enlargements 10  $\mu$  or longer, may be found in all well-stained sections.

“4. Nerve-cells of the sympathetic system have a probable existence within the ventricular walls, and are in form spindle, pyramidal, or stomach-shaped. The axis-cylinders from these cells (mouse) are directly connected with the fibres of the varicose plexuses. A spray of terminal fibres upon the isolated cells is probable.

“5. More complex end-apparatus than the simple bulb of the varicose net-works has only been seen within the ventricles of the highest orders of vertebrates examined,—the dog, mouse, and albino rat; but, from the rarity of the observations, their constant presence is by no means positive, but is probable. True end-plates have not been found.

“6. All the eight species of animals examined presented similar intrinsic ventricular nervous structures, muscular net-works with simple bulbar end-apparatus, neural thickenings, and cell-like bodies resembling small ganglionic nerve-cells, though of different forms; but complex endings of the fibres were seen only in three of the varieties.”

W. Nikolajew <sup>320 1006</sup><sub>Suppl., '93; Apr., '94</sub> offers a preliminary study, which may be summed up as follows:—

The vagus of the frog contains fibres which end in the pericellular net and whose origin is in the medulla. Since the pericellular net simply lies upon the protoplasm of the nerve-cells without entering the cell-substance, the influence on the nerve-cell must be by contact simply. The pericellular net is accordingly analogous with fibre-endings within the central system:

*Cerebral Arteries.*—Hager and de Boeck, <sup>685 278</sup><sub>Sept., '94; Jan., '95</sub> from their studies and examinations, deduce the following conclusions as to the structure of the cerebral arteries: 1. There are, in the vascular net-works, certain special and characteristic anatomical arrangements that endow them with a certain autonomy. Frequently, and particularly in the organs with intermittent functions, the mode of branching of the arteries is such that a multiplicity of routes is offered to the blood; the resistance to the passage of the circulation by these various ways differs according to the degree of contraction or of potency of the vessels, and the distribution of the blood to the various organs undergoes corresponding variations. 2. The anatomical disposition here noted is especially shown in the brain; the cerebral arteries do not supply distinct cortical branches, and the cortical circulation is, therefore, constantly dependent on that of the mesocephalon. 3. This structure and manner of distribution of the cerebral arteries have, for their result, the insurance of a constant and regular cortical circulation as long as the pressure in the carotids is sufficient to maintain the vascular tonus; this is the case during waking hours or intellectual activity; in sleep, on the contrary, cortical ischæmia exists, due to the lowering of the arterial pressure and the general dilatation of the arteries throughout the vascular system. 4. No sphincters or other special muscular histological arrangements exist in the musculature of the cerebral arteries; the special arrangements of the encephalic circulation and the peculiarities of their functioning are due, before all, to the disposition of the vessels in superposed and not anastomosing axes.

*Digestive Tract.*—Pilliet <sup>165</sup><sub>Jan., '94</sub> finds that the peptic glands of bony fishes have the common characteristic of being filled with a single sort of cells. Any slight difference observed between those of the glandular borders and the centre is explained by the statement that the former belong to the cells of the glands, of which they have all the characteristics, while the second belong to the

principal cells, those of the border having but one degree of the development of the latter. Besides, from their first appearance, the peptic glands of fishes consist of agminate tubes, this arrangement being effaced in mammals by the elongation of tubes and the multiplication of orifices. This nodular disposition sometimes re-appears in man in certain pathological conditions, as in cirrhosis of the liver. Golgi<sup>409</sup><sub>v.19, No.3</sub> studied the fine structure of the peptic glands in mammals, using his bichromate and nitrate-of-silver stain. Erik Muller,<sup>2125</sup><sub>'93</sub> in studying the same subject in the same manner, found a canalicular net-work closely surrounding the nucleus, leaving a zone of cellular substance at the periphery. This net-work diminishes toward the lumen of the gland and separates into two or three canaliculi, which reunite to form a single canaliculus projecting at a right angle in the central canal of the gland. Each secretory delomorphous cell is thus provided with an excretory canaliculus, and, in young animals, even four to six or more. This explains the fact observed by Stohr, that the delomorphous or parietal cells have an apical prolongation extending through the adelomorphous cells to the glandular lumen, and also establishes the fact that the parietal cells of Heidenhain possess secretory activity.

N. Czermak<sup>29</sup><sub>No.44, H.4</sub> concludes that the lymphatic follicles of the intestinal wall are the result of condensation of the mesenchyme, and that the epithelium takes no part in their formation. The cellular portion of the mesenchyme, with its prolongations, undergoes chemical transformation, but the nuclear protoplasm remains unchanged. The cell thus constitutes a centre of growth—a retoblast—which presides over the development of the net-work and the formation of new spaces. Later, it may, in turn, become changed into a flattened nodal plaque resting against the reticulum, its nucleus becoming much paler and finally disappearing altogether.

Ramón y Cajal,<sup>927</sup><sub>No.39, '93</sub> from studies in the guinea-pig, rabbit, dog, rat, mouse, and ox, according to Golgi's method and his own double-staining method, has ascertained that the ganglia of the intestines consist of multipolar cells, the expansion of which, after several ramifications, pass into the plexuses, ending in smooth muscular fibres or in glandular cells. Each ganglion also possesses transitory fibres, possibly continuous with those of the grand



sympathetic of the vertebral column, and of collaterals terminating between nerve-cells. Each gland, and probably each group of smooth fibres, no matter how small, contains interstitial nerve-cells, the expansions from which re-inforce the plexus formed by the visceral ganglia and the fibres of the grand sympathetic of the vertebral column. Each chiasm represents not only an interlacing, but a bifurcation of several transitory nerve-fibres and of expansion of the cells of the visceral ganglionic cells. No anastomoses exist either between the cells of the visceral ganglia, the transitory or collateral fibres, or even the interstitial cells.

E. Laguesse <sup>165</sup><sub>Jan., '94</sub> has confirmed the existence of a pancreas in all bony fishes,—a fact asserted in 1873 by Legouis, but to which little credence has heretofore been given, owing to the diffuse state of the organ and the absence of sufficient histological proof. In the trout the pancreas is developed from three buds,—one principal early portion, the dorsal, being contemporaneous with that of the liver, and two accessory ventral buds, which gradually extend in large tracks, becoming afterward dissociated through the abdominal mass and more and more separated by the formation of adipose tissue. Comparative anatomical study has enabled the author to find these different stages, each remaining permanent, in different kinds of fishes.

Pilliet <sup>927</sup><sub>No. 22, '94</sub> has observed glandulæ in the ampulla of Vater in the rabbit, the dog, and in man. In the dog the ampulla occupies a curved niche on the inner surface of the circular muscle of the intestine; it is olive-shaped and composed of lamellar villousities which come from the chorion and ascend to the internal orifice of the ampulla, which they partly occupy. They are covered with prismatic cells secreting mucus, and between them are glands comparable to Brunner's glands in the duodenum. In man these glandular groups may penetrate deeply into the thick wall of the ampulla, thus explaining the glandular epithelioma here found. These studies are interesting in connection with extirpation of the pancreas.

*Ovaries and Tubes.*—Gawronsky <sup>317</sup><sub>No. 11, '94</sub>; <sup>5</sup><sub>June</sub> states that there are two sets of nerve-fibres in the uterus, one set being distributed throughout the muscular layer without anastomosing, and terminating in multipolar ganglion-cells in the submucosa; from these cells spring numerous filaments which enter the mucosa, and

terminate either in epithelial cells or in terminal bulbs. Another set, which also traverse the muscular layers, end directly in the epithelial cells and glands. In the Fallopian tube the nerve-fibres interlace freely and give off numerous twigs which terminate in points or bulbs just beneath the epithelial layer. Bundles of nerves can be demonstrated in the parenchymatous zone of the ovary, which do not communicate with one another. In some preparations delicate branches can be traced to the follicles, where they either end directly in the theca folliculi or enter the latter after a more or less circuitous course. Fibres are frequently seen which end in terminal bulbs in the membrana granulosa. Occasionally, fibrils can be traced through the granulosa to the immediate vicinity of the ovum, though it is impossible to establish their ultimate termination.

The nerves in the muscular coat of the vagina present numerous sharp bends; at these points lateral branches are given off which take the same course as in the muscular layer of the uterus. After they enter the submucosa the fibres change their direction, form flexures, and reach the epithelial surface. They terminate in points or bulbs in the deeper layer of epithelium.

G. Retzius <sup>2127</sup>/<sub>98</sub> studied the nerves of the ovary in the kitten. From the researches of Riese and von Harff it is known that many nerves are present in the ovary,—in fact, it is extremely rich in nerve-fibres and fibrils. They are most abundant in the central part, where they form rich plexuses around the blood-vessels, while they are also fairly numerous in the follicular zone,—where they form a net-work around the individual follicles; but they do not appear to penetrate into the interior of the Graafian follicles. Boddaert <sup>52</sup>/<sub>Sept., 198</sub> describes a nervous net-work accompanying the arteries, arterioles, veins, and venules of the ovary in the dog, guinea-pig, rat, mouse, tortoise, cat, and calf. He did not, however, observe a vasomotor net-work along the capillaries nor in points where there was no smooth muscular fibre. He also failed to meet with any ganglionic cells. Besides these net-works there was seen in the stroma of the ovary, especially in the cortical zone, a rich raphé of trunks and fibres interlacing in every direction, penetrating into the albuginea, the fibrils reaching as far as the base of the germinating epithelium, twisting about the young follicles and forming a close net-work about the adult

ones. The author found fibrils even in the granular layer, where they terminated by a cylindroid enlargement, but he does not dare to assert that they possess the characteristics of terminal organs.

Köstlin,<sup>54</sup><sub>No.11,'94</sub>; <sup>5</sup><sub>Sept., '94</sub> from extended microscopical observations in the lower animals, as well as in the human subject, arrives at these conclusions: In the Fallopian tubes of sheep there are but few nerves in the mucosa and no plexuses. The nerve-fibres are either distributed directly to the epithelium or first enter the extremities of the mucous folds and then terminate in the cells; their ultimate terminations in the epithelia were not demonstrated. Triangular ganglion-cells are found in considerable numbers in the mucosa, from which extend many fibres thicker than the other ones and not so tortuous, which sometimes anastomose with other neighboring processes and can be traced directly to the epithelia. In the tubal mucosa of pigs there is a rich anastomosis of nerve-fibres, with finer branches, which can be followed into the epithelial cells, though it is impossible to discover their ultimate terminations. In the uteri of rabbits intricate plexuses exist in the endometrium, their fibrillæ terminating either directly in the epithelia or in end-bulbs. In guinea-pigs fibres can also be traced into the glands, where they end between the cells. Numerous ganglion-cells with interlacing processes are also seen, especially in calves, in which animals spindle-shaped cells are found with numerous interlacing processes, which may belong to the nervous system, though this is doubtful. The same cells are seen in the endometrium in sheep.

*Spleen.*—Kölliker,<sup>2129</sup><sub>No.2,'93</sub>; <sup>90</sup><sub>July, '94</sub> by Golgi's rapid method, finds that in the spleen of the calf, rabbit, and mouse the nerves are arranged in two groups: (1) motor nerves for the blood-vessels and trabeculæ and (2) sensory nerves. The vasomotor nerves enter the organ with the large arteries. In the walls of the large arteries the main trunks form a well-marked superficial plexus, with oblong meshes in the adventitia, and a deep, more quadrate network in the tunica media, and some end in little branched arborizations in this coat. The smaller arteries and the trabeculæ receive their nerves from a rich maze of fibres in the pulp, consisting of axis-cylinders, which, however, do not anastomose. Other fibres form a plexus on the surface of the trabeculæ, and from this fibrils penetrate into the interior of the trabeculæ (which contain much smooth muscle) and end by fine arborizations. Other free ter-

minals are found, which Kölliker regards as sensory fibres. R. Fusari<sup>409</sup><sub>v.19,p.288; July,'94</sub><sup>90</sup> has also investigated this subject, and he used the spleen of the rat and calf. Some of the nerves entering at the hilus follow the arteries, and others run independently. The fibres of the same or adjoining nerves form a net-work, but the fibres themselves do not anastomose, and when they divide it is always dichotomously. From this net-work fibres are given off, which end free, partly in the pulp, and also within the Malpighian corpuscles. Some end by swellings on the capillaries.

*Nerve-Cells.*—C. F. Hodge<sup>316</sup><sub>Aug.1,'94</sub><sup>1006</sup><sub>Sept.,'94</sub> has compared sections of the first cervical ganglion of a still-born babe (osmic-acid preparations) with similar sections from a subject who died at 92 years of age, and found that in the latter case the nucleolar granules do not stain with osmic acid; that the nuclei are shrunken in size, have irregular contours, and (unlike fatigued nerve-cells) stain no darker than the cytoplasm. Sections of the nervous system of young and old bees give much more emphatical testimony to the same alterations. The number of cells is also greatly reduced in the old specimens. E. Ballowitz,<sup>316</sup><sub>R.9,II.5,6</sub> by means of Golgi's method, has demonstrated two superposed nervous net-works in the electric organ of the torpedo. One of these, already described by Kölliker, is the termination of the cylinder-axes of all the nerves which reach the electric plaque. The second, much more delicate, is above the first, and consists of rods varying in shape and relative direction. This net-work of rods he considers as a special formation of the electric organ.

Dogiel<sup>29</sup><sub>II.5,6,'93</sub> once more affirms that the protoplasmic prolongations of a given cell, after successively dividing, become definitely resolved into a number of fibrils which anastomose with the ramifications of neighboring cells belonging to the same type, thus forming a veritable net-work. This conclusion, as is known, is in opposition to the theory now prevailing, of the complete individuality of the nerve-elements. Dogiel shows that in the internal ganglionic layer of the retina in man, and in the middle layer in pigeons, the nerve-cells are united not only by a net-work resulting from anastomosis of the finer protoplasmic ramifications, but also by direct anastomoses. These are in the form of a thick prolongation, stretched between two contiguous elements or two situated at some distance, and uniting either the two cellular



bodies themselves or two protoplasmic prolongations coming from them. These anastomotic fibres give out through their entire length, lateral branches, which, like other protoplasmic ramifications, go to take part in the protoplasmic net-work.

Guignard, <sup>920</sup><sub>July, '94</sub> from his first studies on the attracting spheres or centrosomes of cellular karyokinesis, considers these bodies as permanent organs of the cells, independent of the nucleus,—that is, occupying a position outside of it in a state of repose. Other authors, however, notably the zoölogists, have claimed that these bodies appear only at the moment of division, and that they form an integral portion of the nucleus itself. Karsten has adopted the latter theory from his observations on vegetable cells, describing two nucleoli which come out of the nucleus when the latter loses its enveloping membrane. Guignard has again studied the subject, and shows that these differences of opinion arise from the peculiar manner in which the nucleoli comport themselves during the division of certain vegetable cells. There are, it is true, nucleoli which come out of the moving cytoplasm, but they are more or less absorbed and are never the source of the centrosomes, which are really permanent organs of the cell. K. W. Zimmerman <sup>29</sup><sub>B. 41, H. 3</sub> modifies the proposition of Van Beneden relative to the constance of the attractive spheres, and says that there exists in each cell a special modification of the protoplasm presiding over certain processes, viz., archiplasm. Generally this archiplasm occurs in the form of a typical attractive sphere, with centrosome and irradiations, but it may occur in altogether different types, as in the pigment-cells of certain bony fishes. However, he does not say that the attractive sphere is not the typical form of the archiplasm; the special arrangement of the latter in the pigment-cells may be considered as a secondary disposition. Van Gehuchten <sup>52</sup><sub>T. 8, No. 1, '94</sub> asserts, from his recent researches, that the fibres of Meynert's fasciculus originate in the numerous nerve-cells situated in the spiral ganglion, and that they terminate in free ramifications in the gray substance of the intra-peduncular ganglion. This fasciculus is therefore a motor one, being constituted of descending nerve-fibres or centrifugal conduction fibres. The central motor fibres of the cerebro-spinal axis do not consist only of pyramidal fibres uniting the gray cortex of the anterior brain with original nuclei of peripheral nerves, as admitted by most

authors. There are, besides, a great many short central motor apparatuses uniting the inferior gray matter of the cerebro-spinal axis with the primary nuclei of nerves. Among these are (1) a portion of the fibres of the inferior cerebellar peduncles, uniting the gray matter of the cerebellum with the radicular cells of the anterior horns of the medulla (Marchi); (2) the posterior longitudinal fasciculus, uniting the anterior projections of the corpora quadrigemina with the primary nuclei of the cranial and rachidian motor nerves (Held); (3) the fasciculus retroflexus, or Meynert's fasciculus, uniting the spiral ganglion with the nerve-cells of the intra-peduncular ganglion (Van Gehuchten). The fibres of the long motor apparatus probably serve for voluntary movements and those of the short apparatuses for reflex movements.

*Special Senses.*—J. W. Findlay, of Glasgow, <sup>277</sup><sub>July, '94</sub> in a research into the histological structure of the olfactory organ, with silver nitrate, corroborates the conclusions of Golgi, but concludes that mitral nerve-cells are present not only in the nerve-cell layer, but also between the glomeruli.

A. S. Dogiel <sup>29</sup><sub>V. 40, No. 4; Apr., '94</sub> <sup>1006</sup><sub>July, '94</sub> comes to the following conclusions respecting nerve-termini in the lachrymal glands: 1. Its fibres, which surround the blood-vessels and ducts and for the most part enter with them, are almost exclusively non-medullated. 2. The nerve-fibres and branches produced by their division surround the tubules with a few loops and form a mesh-work lying upon the membrana propria. 3. From this net-work fine branches and fibres pass out and pass through the membrana propria. These fibres gather about the bases of the glandular cells, and, by crossing and blending, form a supracellular net-work. 4. Very small fibres pass from the last mentioned and form an intercellular net-work, in whose meshes the cells lie. 5. The occasional appearance of free termini is misleading, being due to imperfect coloring. The above arrangement is considered typical for all serous, if not all mucous, glands.

The author seems unaware of the work of Berkley along similar lines.

G. Retzius <sup>316</sup><sub>B. 9, II. 31</sub> has been able to confirm, by Golgi's method, the opinion formerly expressed by him in regard to the ophthalmic ganglion, namely, that it is composed of cells belonging exclusively to the sympathetic type. It must therefore be classed

among the sympathetic ganglia, together with the optic, sphenopalatine, and submaxillary. The destination of the cylinder-axis prolongation of the multipolar elements which constitute it, as well as the distribution of fibres coming from other parts and terminating in it, are as yet unknown.

A. S. Dogiel <sup>320</sup><sub>Anat. Ab., 5, 8, '98</sub> <sup>1006</sup><sub>July, '94</sub> challenges the doctrine of strict anatomical independence of neurons. In the retina he finds not only anastomoses of the fine branchlets of the dendrids, but also a direct anastomosis of the cells themselves by means of a thick fibre. The author concludes that in the retina, at least, the nerve-cells constitute a colony of individuals all intimately bound together by means of their protoplasmic processes. From researches upon the finer structures of the retina, M. Borysiekievich <sup>190</sup><sub>May, '94</sub> <sup>814</sup><sub>Sept. 1</sub> draws the following conclusions: 1. The radial fibre of Mueller begins at the membrana limitans interna, and ends at the layer of pigment epithelium in the form of rods and cones. It is a tricellular formation of cylindrical form, consisting of a dense capsule and less consistent contents; it thus forms a tube which, in its course, gives off no lateral processes and possesses a smooth surface. 2. Rods and cones are of equal length. 3. Within the fovea centralis all differential characteristics between rods and cones are wanting; the so-called cones of the fovea correspond wholly to the rods from the lateral portions of the retina; hence, it is quite justifiable not to speak of cones, but of rods of the central fossa. 4. Not infrequently two granules are demonstrable within the fibres of the rods and cones. Hence, the sum of the rods and cones must be less than that of the external granules. 5. The external granules change their position in the Mueller tube; the influences under which the latter occurs were not determined with certainty. 6. In the region of the yellow spot a few Mueller tubes, provided with two granules, are also found within the internal granular layer. The "internal granules" likewise show a change of position. 7. At the thinnest portion of the fovea centralis only the two limiting membranes—the layer of the external granules and that of the rod organs—are present. Here the number of the external granules is greater than outside the central fossa. A constant relation exists between the external and inner granules of the macula lutea, in that the external granules increase the more in number the smaller the external granular

layer is, and *vice versâ*. 8. The portions of the retina sensitive to light are to be sought within the Mueller tubes.

S. E. Hensen <sup>2130 1006</sup><sub>'93; Apr., '94</sub> finds the path of the optic stimuli to be composed of fibres from the large ganglion-cells of the retina which end in the geniculate bodies and other fibres arising in cells of the geniculata and ending in the cortex of the occipital lobe. The course and position of the fibre-bundles are as follow: The macular bundle, which, at the papilla, lies latero-ventrally, becomes more central as it passes centrad, and is the central bundle in the chiasm and tract. The uncrossed fibres at the papilla form two bundles, a dorso-lateral and a ventro-lateral, separated by the macular fibres; further back these unite to form a lateral bundle. The crossed fibres at the papilla lie in a medial or dorso-medial plane and retain this position throughout their course. On entering the chiasm, the uncrossed fibres, which have hitherto formed a compact crescentic bundle, divide into a number of horizontal rays which alternate with similar rays formed by the crossed fibres. A certain proportion of the uncrossed fibres keeps its course at the periphery of the chiasm, but most of them pass medially, intermingling with the crossed fibres. The crossed fibres, in passing through the chiasm, change from the dorso-median position to a ventro-median position in the tract. The uncrossed fibres also change, occupying in the tract a latero-dorsal position. Fibres representing the dorsal half of the retina run dorsad in both bundles. These bundles remain separate as far as to the geniculatum, where they coalesce. The optic fibres, in part, form the capsule of the geniculate body and, in part, enter it, forming the so-called medullary lamellæ. The geniculate body is, therefore, the main visual ganglion, though fibres can be traced to the pulvinar and anterior quadrigemina. These latter fibres, however, do not seem to transmit visual impressions, and a lesion there does not seem to cause a defect in the visual field. From the ganglion-cells of the geniculate body fibres pass backward into the occipital optic tract. They form a compact fasciculus about five millimetres in diameter, which passes at the level of the first temporal fissure and second temporal convolution backward to the bottom of the calcarine fissure. In this optic path the fibres for the dorsal half of the retina lie dorsad, as in the anterior part of the tract. The cortical visual centre lies at the bottom



of the calcarine fissure, and is restricted to it. A unilateral lesion in this fissure causes complete hemianopsia. The pulvinar and quadrigemina are also connected with the cortical visual centre; these are probably reflex paths. The theory that the visual tract takes part of the formation of the internal capsule or decussates behind the chiasm is incorrect. The macula is often innervated from both sides of the brain.

Sala <sup>29 866</sup> <sub>B.42, '93; Dec.</sub> has attempted to determine this question by the use of Golgi's method on calf-embryos and newborn kittens, and concludes that: 1. Neither the posterior or dorsal, Deiter's nor Bechterew's nuclei are nuclei of origin for the fibres of the acoustic nerve. The cells of these nuclei are of Golgi's first type; they send off fibres which probably form part of the formatio reticularis. 2. The anterior, or ventral, nucleus is the true nucleus of origin for the fibres of the posterior root of the acoustic nerve (cochlear nerve), and the acoustic tubercle is the nucleus from which the greater part of the fibres forming the striæ acusticæ originate. 3. The anterior nucleus consists, in its central portion, of elements bearing the character of central nervous elements, while its peripheral portion is composed of encapsulated elements which resemble the peripheral nerve-cells. The axis-cylinder process of the central cells is like that of the second type and forms a net-work, from which the fibres of the inner and anterior part of the anterior root of the nerve originate. The others send out their axis-cylinder processes, which implant themselves, at a right angle, into the fibres of the anterior and posterior roots. 4. Fibres from the anterior nucleus are found in the corpus trapezoides, which are equivalent to one of the branches of the T-shaped division of the fibres originating from the peripheral cells of the nucleus. 5. The inner portion of the posterior root (cochlear nerve) originates in the nervous net-work of the anterior nucleus. The outer portion (striæ acusticæ) has its origin in greater part from nervous cells of the tuberculum laterale; a small portion originates in the central cells of the anterior nucleus. 6. A connection between the anterior root and the cerebellum is formed by fibres which run from the anterior root through a part of the cerebellar peduncle, pass along the lateral wall of the fourth ventricle and pass into the embolus. 7. The anterior root of the acoustic nerve contains fibres derived from the restiform

body. 8. The peripheral part of the anterior nucleus must be regarded as a peripheral ganglion analogous to the spinal ganglia, belonging to the anterior root and the inner part of the posterior root.

Gustaf Retzius <sup>370</sup><sub>V.55, Suppl., p.246; Nov., '94</sub> <sup>673</sup> has studied the earlier phases of development of the nervous elements of the auditory ganglion, endeavoring to trace the ramifications of the filaments toward the periphery and centre. By means of Golgi's method he succeeded in obtaining a series of very distinct and instructive preparations, showing that many of the nerve-cells in the spinal ganglion were not bipolar, but rather multipolar, not more than three filaments from each cell being seen. Of these filaments one was directed centripetally toward the brain, the other two centrifugally, ending in free ramifications in the papilla basilaris. Comparison of a number of these cells showed a typical series of almost all the transition forms between the bipolar and tripolar cells. The two filaments of the tripolar cells gradually approached each other until they coalesced into a single filament, which became thinner and thinner, and from the apex of which peripheral filaments ran out in different directions, thus giving rise to the bipolar form of the developed acoustic ganglion. The central filament of the tripolar cells was of the axis-cylinder type, the other two resembling protoplasmic filaments. Although nerve-fibres have from time to time been described as ending in the hair-cells of the inner ear, Retzius states that neither in the crista or macula acustica, nor in Corti's organ has he found nerve-fibrils so ending. In all these situations they end free, the hair-cells being surrounded by a net-work of nerve-fibrils which do not go directly into the cells.

In the teeth of fishes and lizards nerve-fibrils end in the pulp and branch therein freely, where they lie close under the dentine, but they do not penetrate the dentinal tubules. C. Röse <sup>265</sup><sub>No.23, '93; July, '94</sub> <sup>90</sup> finds that in mammals no nerve-fibrils pass into the dentinal tubules.

In the lungs the nerves, as is known, accompany the bronchi, but the terminal branches penetrate in the human foetus (fifteen centimetres long) only to the neck of the alveoli, and rarely do they expand upon the alveolar wall. They are probably largely motor for the smooth muscle of the bronchi.

*Skin.*—Through a new method of metallic impregnation

discovered by himself, Tartufferi <sup>472</sup><sub>Oct., '93</sub> has shown, in the capsule of Pacini's corpuscle, (1) a *sustaining* apparatus, an integral portion of the capsule itself, and composed of two exceedingly fine networks of elastic fibres, one being internal and the other external; (2) a system of coarse and short elastic fibres distributed in a characteristic and peculiar fashion, and uniting the two networks. The disposition of these fibres is concentric to the ovoid of the capsule, and, together with the net-works, must greatly increase the strength of the capsule; hence the name "sustaining apparatus." The new method employed by the author consists of immersing the tissue, freshly removed from the animal, in a solution of sodium hyposulphite and then in a silver-chloride solution for a given time at a certain temperature.

Kromayer <sup>29</sup><sub>B. 42, H. 1</sub> states that the pigment met with in the epidermis in certain regions in the normal state, or in certain pathological cases, is the result of direct transformation of the protoplasmic prolongations of the epithelial cells. The elements described under the names of chromatophores are not connective elements charged with pigment immigrating into the epidermis, but simply irregular pigmented streaks of epithelium, their presence indicating the beginning of pigmentation. The theory that the pigment originates in the derm, and is transported into the epidermis by ramifying cells,—the so-called chromatophores,—has no anatomical foundation.

Numerous researches exist, but the most recent is that of Van Gehuchten, <sup>52</sup><sub>V. 49, '98</sub> <sup>90</sup><sub>July, '94</sub> who by Golgi's rapid method has studied the nerve-terminations in the skin of the external ear, tail, and snout of newly-born white rats and mice, or the same animals up to six days. In ordinary hairs—*i.e.*, those devoid of a blood-sinus—each hair-follicle receives usually only one nerve-fibre, which reaches it a little below its neck, just below where the duct of the sebaceous gland joins it. At the follicle this fibre divides into two branches, which pass one in front and one behind the hair to form a "nerve-ring," from which a number of separate fine nerve-fibres proceed upward vertically for some distance to end in free ends, it may be with slight thickenings, thus forming a crown of fibrils (12 to 40) around the hair in the thickness of the follicle. These vertical fibres do not anastomose, and they end just outside the hyaline membrane of the follicle. The nerve-fibre to the follicle

in most cases is a collateral fibre,—a branch of another fibre destined for another part of the skin; very frequently that terminates in the papillæ; so that the sensibility of the skin and the hair depends on the same peripheral nerve. The branch to the follicle usually descends from the nerve under the epidermis. In no case have the terminations been found inside the vitreous lamina, they end in the connective-tissue sheath outside the lamina vitrea. No fibres have been traced into the papilla of the hair-follicle.

In the large tactile hairs, or sinus hairs,—*i.e.*, those provided with a blood-sinus,—several nerve-fibres form a fasciculus and enter the follicle near the base; they traverse the external connective-tissue coat and the erectile tissue of the blood-sinus to reach the inner fibrous coat. On entering, the fibres separate and form a nervous mantle round the hair and end at different heights. The fibres branch in the inner fibrous coat, but the branches do not anastomose. They never form nervous rings. The fibres end in free, very complex arborizations at all levels from the base to the neck of the follicle, and they do not seem to penetrate the hyaline layer, although they come close up to it. There are no terminal nerve-cells in the course of the fibres.

*Fat-Cells.*—Observers are still far from agreeing as to what the original fat-cell form really is, the most widely accepted theory being that it originates in some form of connective-tissue cell. W. C. Borden, of the U. S. Army, <sup>1</sup><sub>Feb. 24, '04</sub> after a careful study of the subject, reached the following conclusions: 1. Its occurrence in the lower vertebrates in special organs, composed of gland-like cells, developed from special centres. 2. Its first appearance in foetal higher vertebrates in gland-like masses, developed from special centres, homologous with the special fat-organs of the lower vertebrates. 3. The continuance of adipose tissue in the lower vertebrates as fat-glands, never changing into other tissue, and as distinct in structure and function as other ductless gland-tissue. 4. The limits placed upon the place of occurrence of adipose tissue in all animals, and its non-appearance in certain regions where connective tissue is always present. 5. Its specialized metabolic functions and the gland-like development and arrangement of its blood-supply, all of which place it in an entirely different histological and physiological class from that of the supporting functioned connective tissues.



## MICROSCOPICAL TECHNOLOGY.

Henry G. Piffard, of New York, <sup>59</sup>Mar. 24, '94, ascertained that, by closing the systems as far as the correction-collar would permit and shortening the tube-length to about 155 millimetres, the objective would correct perfectly with monobromide of naphthalin. Not only was the overcorrection introduced by the monobromide completely neutralized, but the character of the image was remarkably improved. He then investigated the possibility of error in the makers' statement as to the angular aperture, and found that with systems open and water contact the angle measured 143 degrees; with systems half closed and oil contact the angle was 144 degrees; and with systems entirely closed, using monobromide contact, the angle was also 144 degrees. Applying the usual formula  $N. A. = n. \sin. u.$ , the result gave  $N. A. = 1.56$ ,—the highest aperture, so far as known to him; that has ever been obtained with an achromatic lens, working with crown-glass slides and covers. The ideal immersion-lens for general bacteriological, biological, and histological research, in his opinion, would be one having the largest practicable angular aperture, and corrected for either the 160-millimetre or 216-millimetre tube, and a cover-glass not exceeding 0.20 millimetre. The adjustment should be arranged to close a little beyond the monobromide point and open a little beyond the oil point, so as to permit the objective to be used at will with either fluid. It is possible, however, that the optician, with monobromide in mind, would find it desirable to make some slight changes in his present formula.

*Staining.*—Kantorowicz <sup>854</sup>Feb. 22, '94; <sup>2</sup>Apr. 7, '94 recommends thionin as a stain for tissues affected by amyloid changes. Hoyer has already showed that mucin is stained red or reddish-violet by this reagent. In a section treated by thionin the ordinary tissue-elements—such as cells, nuclei, connective tissue—are stained blue or violet blue, whilst amyloid material stains a light blue or lilac and is readily distinguished. Preparations are hardened in alcohol or sublimate and imbedded in celloidin. Sections are cut into alcohol (80 per cent.), washed lightly in water, and placed for three to five minutes (no overstaining after several hours, but the shorter time is sufficient) in a saturated aqueous solution of thionin. Wash in distilled water. The tint may be preserved—notoriously a difficult task with such preparations—by proceeding as follows: Remove

the section from water to a slide, dry with filter-paper, and further dehydrate and clear by means of a mixture of aniline-oil and xylol (2 to 1) or carbolic acid and xylol (1 to 3). Wash off the mixture with xylol and mount in dammar. In this plan, alcohol, which has a strong decolorizing action, is avoided. The stained amyloid material is, however, best shown in sections mounted direct from water. In this connection it might be useful to allude to a new method of producing the iodine reaction in amyloid tissue permitting the demonstration of the extent of amyloid degeneration, described by Galeotti.<sup>876</sup>  
Mar. 1, '94 It consists in soaking the sections in a solution of potassium iodide, then rapidly washing them in distilled water, and immersing them in chlorine-water. The amyloid tissue alone retains the iodine salt; so that when this latter is attacked by the chlorine-water it is the altered part alone which is stained by the liberated iodine. The test is said to be extremely delicate.

Rosin,<sup>69</sup>  
No. 36, '93; Dec., '93<sup>866</sup> in a study of staining properties of Ehrlich's neutrophile (triacid) solution, found the constituents of the cord to be stained as follows: The medullary sheaths an orange yellow, the axis-cylinders a vivid red, the surrounding connective tissue violet, the coarser connective-tissue bundles and the adventitia of the vessels a rose color, their endothelia as well as the nuclei of the neuroglia a bluish green, and their protoplasm a pale rose. Degenerated fibres are detected by the absence of the orange sheath and the presence of gaps in the violet net-work. The gray substance shows numerous naked axis-cylinders. The ganglion-cells stain strongly, being of a red color with a tinge of brown. Their nuclei do not stain at all, being seen as clear vesicles in the dark-red cells, while the nucleoli take the color of the protoplasm.

As is well known, Golgi's original and later methods give good results with young and embryonic animal brains, but not with adult or human brains. W. Lloyd Andriezen, of Wakefield,<sup>2</sup>  
Apr. 28, '94 after a systematic research, obtained good results by means of the following modification of Golgi's method: Thin slices (two to four millimetres in diameter) of brain, with the pia arachnoid intact, are suspended by a thread or a glass (or platinum) hook, in K. bichromate (2 per cent.), 95 cubic centimetres ( $3\frac{1}{6}$  fluid-ounces), to which, after ten to fifteen minutes, 5 cubic centimetres ( $1\frac{1}{4}$  fluidrachms) of 1-per-cent. osmic acid are added; this is kept

in the dark for twenty-four hours, then changed into K. bichromate ( $2\frac{1}{2}$  per cent.), 90 cubic centimetres (3 fluidounces); osmic acid (1 per cent.), 10 cubic centimetres ( $2\frac{1}{2}$  fluidrachms); in which the specimen is kept suspended for two days; then is finally changed into Golgi's mixture of K. bichromate (3 per cent.), 80 cubic centimetres ( $2\frac{1}{2}$  fluidounces); osmic acid (1 per cent.), 20 cubic centimetres (5 fluidrachms). The total fixation and hardening of three and one-half days shows nerve-cells and the two types of glia-cells (fibre-cells and protoplasmic cells) quite well; four and one-half days show more nerve-cells, especially cell-bodies; six days are needed to show axis-cylinders, nerve-fibres, and collaterals. On an average it is advisable to have two specimens, hardened three and one-half and four and one-half days, respectively. The specimen is then rinsed in distilled water for one or two seconds, and plunged into  $\text{AgNO}_3$  solution ( $\frac{3}{4}$  per cent.) in the dark for five to fifteen minutes; then changed into 100 to 120 cubic centimetres ( $3\frac{1}{4}$  to 4 fluidounces) of  $\text{AgNO}_3$  solution, to which exactly 1 drop of formic acid has been added; it is then placed in an incubator, in the dark, at a temperature of  $25^\circ$  to  $27^\circ$  C. ( $77^\circ$  to  $81^\circ$  F.), changing it for fresh silver solution after twenty-four hours. The total staining in the silver solution should be three and one-half days or four and one-half days, respectively; three days often suffice. The final steps of the procedure he defines as follows: Rinse in methylated spirit and fix in wax or spirit 15 minims, followed by absolute alcohol 15 minims, thin celloidin one-half hour, and fix on cork; cut under spirit; pick out the best sections and place in large quantity of distilled water until nearly freed from spirit, about five minutes; then place sections in  $\frac{1}{4}$ -per-cent. solution of  $\text{AgNO}_3$  for one-half to one hour; dehydrate in spirit, then in xylol-pyridine, equal parts; clear in xylol (twice) and mount, after blotting, in xylol-dammar, without a cover-glass, hastening the process of drying by placing the slides in the incubator at a temperature of  $37^\circ$  to  $40^\circ$  C. ( $96.8^\circ$  to  $104^\circ$  F.) for one day or a little longer. The latter procedure is necessary; otherwise, even after months, the specimens may begin to spoil.

Successful preparations show the nerve-cells and their processes down to their finest ramifications and endings. The same holds true with regard to the glia-cells, both protoplasmic and fibre-cells. All these cell-elements are sharply differentiated

from one another and from the clear ground-substance. Axis-cylinders and collaterals, ascending nerve-fibres, ending freely by branching fibrils in the cortex, also can be seen in great numbers. The method is applicable to brains, provided post-mortem changes are not too advanced or the tissue disintegrated or softened.

Fischel, <sup>29</sup><sub>V.42,'93</sub> <sup>866</sup><sub>June,'94</sub> in a study of the action of silver nitrate upon the nervous elements, found that the transverse striation seen in nerve-fibres and ganglion-cells after the action of nitrate of silver is artificial, and not due to structural peculiarities. He also observed the same striation in Wharton's jelly, in the connective tissue of the skin, in the larger vessels, the kidneys, and other organs, and concludes that it may be found in any colloid tissue hardened in nitrate-of-silver solution in the presence of an acid. H. Rabl <sup>2131</sup><sub>'93</sub> has independently reached identical conclusions.

L. Azoulay <sup>7</sup><sub>No.10,'94</sub> <sup>1006</sup><sub>Sept.,'94</sub> has devised a modification of Weigert's method of staining, for which he claims excellent results and very great economy of time. Its application to the axial nervous system is described as follows: "Harden for three or four months in bichromate, or little pieces more rapidly in a mixture of bichromate of potash (3 per cent.), 100 parts, and osmic acid (1 per cent.), 25 to 30 parts; imbed in paraffin (or collodion or any other suitable medium); section in 90-per-cent. alcohol; free the sections of paraffin with xylol or benzin; treat with absolute alcohol; apply Schweitzer's reagent (ammoniacal cuprous oxide, undiluted) three to five minutes, according to the thickness of the sections; wash, by agitating in distilled water, for about thirty seconds; treat with hæmatoxylin (1 part to 10 of alcohol and 90 of water) either several days old, or fresh and treated with a drop of saturated solution of carbonate of lithium, or merely ordinary hæmatoxylin with alum, for three to six minutes, according to the thickness of the sections; the sections are to be heated on the slide, while bathed in the stain, to 60° C. (140° F.) (pass the slide over a flame until it steams; repeat the heating three or four times, taking care that the preparation floats in the fluid free from the slide); wash in water; treat with Weigert's decolorizer, prussiate of borax, for five, ten, fifteen, or twenty minutes, according to the temperature employed and the thickness of the sections; arrest the decoloration when the large cells have only their nuclei colored a very dark brown; wash carefully in water; mount in



acetone and balsam in benzin or xylol." The decoloration is so slow that one can be secure from decolorizing more than is necessary. The sections keep at least two years and a half.

*Hardening.*—W. McAdam Eccles, of London, <sup>May 26, '94</sup> recommends formic aldehyde as a rapid hardening reagent for animal tissues. He employs it in 40-per-cent. solution for very soft tissues, in 20 per cent. for firmer, and in 10 per cent. for quite firm material. It acts as a most rapid and satisfactory hardening reagent. It does not render any tissue brittle in the way alcohol does, and in no way prevents a stain acting well on the sections. It is therefore a useful adjunct in pathological and histological work.

Bergonzoli <sup>730</sup><sub>No. 1, p. 18, '94</sub> recommends formalin as a preserving and hardening fluid for general histological purposes, having observed that solutions of this drug are deodorant and disinfectant; that pieces of tissue immersed in it are rapidly fixed and hardened, and only shrink to an almost-imperceptible degree. The color is perfectly preserved, only the coloring matter of the blood being dissolved. For nervous tissue it is excellent. Formalin has the advantage over alcohol in that it is not inflammable and is much less expensive.

In a preliminary paper upon the changes in brain-tissue produced by hardening reagents, H. H. Donaldson <sup>248</sup><sub>v. 9, No. 1, '94</sub> studies the effects upon the weight of entire brains, or large portions of such brains, by a few of the common reagents, thus giving an accurate mathematical account of the changes with which we are familiar in the general sense.

Franklin P. Mall <sup>764</sup><sub>Dec., '93</sub> states that nearly all human embryos which come into the possession of embryologists are of little value for careful study, because they have been carelessly preserved. Of fifty embryos less than six weeks old that have come into his hands during the last few years, only six have proved to be of value. In nearly all cases the specimen is destroyed by placing the ovum in very dilute alcohol, and in so doing it is handled very roughly. The best and most convenient method of preserving young embryos is to place the unopened ovum, with the least possible handling, in a large quantity of very strong alcohol. The alcohol of druggists is in no case too strong, and according to his experience is, as a rule, too weak.

*Fixatives.*—Zenker <sup>34</sup><sub>No. 27, '94</sub>; <sup>5</sup><sub>Jan., '95</sub> claims for the following solution all the advantages of the very much more expensive Flemming and Hermann fluids: Distilled water, 100; corrosive sublimate, 5; potassium bichromate, 2.5; sodium sulphate, 1; glacial acetic acid, 5. It is best to add the acetic acid shortly before using; the remaining ingredients may be mixed and kept on hand indefinitely. This fixative combines the advantages of sublimate and Müller's fluid fixation, the finer details of both nuclei and cell-bodies being admirably preserved. There is no shrinkage of the tissues, which stain well by all the usually employed methods, including those for the bacteria, and imbed well in celloidin or paraffin. Small cubes of tissue about one cubic centimetre in volume are immersed in the fixative for twenty-four hours, are washed thoroughly in water, and are afterward hardened in alcohol of increasing strength, any traces of sublimate which may remain in the tissues being at the same time removed by the addition of a little tincture of iodine to the alcohol. The cost of a litre of this fluid is less than fifteen cents.

A thorough investigation of the qualities of formalin as a fixative and suggested by Blum in 1893, has recently been made by Reimer <sup>54</sup><sub>V. 12, Nos. 20, 21, '94</sub> at the suggestion of Eberth, as the result of which it is recommended by him as an almost ideal agent. It was used in 4- and 10-per-cent. solutions, between which the results showed little choice. Its penetration was greater than that of any of the other fixatives with which it was compared (alcohol, sublimate, and Hermann's fluid), no perceptible shrinkage occurred, both nuclei and cell-bodies were well preserved, and the tissues stained brilliantly by the ordinary methods and by those for the bacteria. While immersion for twenty-four hours in the formalin solutions was sufficient to thoroughly fix even comparatively large portions of tissue, no injury resulted from a much longer soaking. The specimens may then be washed in water or dropped immediately into alcohol, the exact strength of which is immaterial, specimens placed immediately in absolute alcohol yielding as good results as those placed first in weaker. In 4-per-cent. solution formalin costs about twelve cents a quart.

H. C. Bumpus <sup>499</sup><sub>Oct., '94</sub> recommends the following method as an effective one in fixing paraffin sections to the slide: A clean slide is covered with the least possible amount of Mayer's albumin.

The upper surface of the slide is then flooded with water by a small brush; the brush is also used for picking up and arranging the sections. The excess of water is removed and the slide warmed for a few moments, care being taken that the sections do not melt. The sections soon expand and float upon the water, which should be drained away and the slide placed on the water-bath. After remaining about fifteen minutes, melt the paraffin and place the slide in turpentine or some other solvent of the paraffin.

## PHYSIOLOGY.

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### BLOOD.

*The Formation of Fibrin.*—Arthus<sup>410</sup><sub>p.552,794</sub> has made quantitative determinations of the amount of fibrin and of the amount of the heat-coagulum at 56° C. (133.2° F.) in specimens of horses' plasma. He finds that the weight of fibrin is always less than that of the heat-coagulum. As the amount of heat-coagulum is, if anything, less than the amount of fibrinogen present in the uncoagulated blood, his results amount to a demonstration that the weight of fibrin is less than the weight of the fibrinogen from which it is formed, and indicate that, in the process of conversion to fibrin, the fibrinogen-molecule undergoes a change. It will be remembered that Hammarsten's theory of the formation of fibrin supposes such a change to occur. Arthus finds, also, that, in plasma which has been prevented from clotting by the addition of oxalate solutions, careful addition of varying quantities of a calcium salt gives varying amounts of fibrin. This result proves that it is possible to obtain a partial coagulation of fibrin in plasma by regulating the available quantity of calcium salt. He was not able to show a distinct quantitative relationship between the amounts of fibrin formed and the amounts of calcium salt added to the solution.

*Sugar in the Blood and its Decomposition.*—F. Schenck's method for removing the proteids from the blood by means of potassio-mercuric iodide and hydrochloric acid, preliminary to a determination of its sugar-contents,<sup>182</sup><sub>B.47,p.621</sub> is explained in detail,<sup>246</sup><sub>v.55,p.208</sub> as it seems to have been misunderstood.

The special points are that the reagents should be added in excess, in which case the precipitation, both of the proteid by the  
(I-1)



double salt and of the mercury by sulphuretted hydrogen, will be complete and rapid; and that the method does away with the necessity of washing the precipitate, which process in other methods is tedious and slow. On account of the difference in cost Schenck has more recently substituted bichloride of mercury in 5-per-cent. solution for the potassio-mercuric iodide; so that he now adds to 50 cubic centimetres ( $1\frac{1}{2}$  fluidounces) of blood, diluted with water up to 100 cubic centimetres ( $3\frac{1}{4}$  fluidounces), 100 cubic centimetres ( $3\frac{1}{4}$  fluidounces) each of 5-per-cent.  $\text{HgCl}_2$  and 2-per-cent.  $\text{HCl}$ . The accuracy of this method is well shown by a table which contains the sugar-determinations made on various kinds of blood to which a known amount of sugar was added. When the sugar was added before the precipitation of the proteids the result was generally a little smaller than when it was added after precipitation, but the loss amounted, on the average, to only 1.5 per cent. of the total quantity added, which is less than the error of the other methods. The titration for sugar was made according to Knapp's method. In his earlier paper Schenck had also proposed, as a method for determining the sugar of the blood, to dialyze and titrate the dialysate. Glycolysis was prevented by acidifying the blood. New experiments, the results of which are brought together in a second table, support the assertion that no loss of sugar occurs in this case. Adding a given quantity of sugar to the blood, this is divided into three portions,—A, B, and C. In A the sugar is determined at once; B is acidified and together with C allowed to stand twenty-four hours at room-temperature, when the sugar in them is also estimated. B showed either no loss at all or one that fell within the limit of error; C frequently showed a loss; often, however, this did not occur, contrary to expectation. Glycolysis evidently does not depend on the reaction of the blood alone; as Arthus pointed out, the addition of reagents which inhibit the breaking down of the leucocytes in unclotted blood also diminish the decomposition of the sugar.

As bearing on this point, Schenck investigates the action of potassium oxalate in the following manner: Fresh blood is treated with potassium oxalate, to prevent clotting, and sugar added. In one portion the sugar is determined immediately, in a second portion after standing some hours at a temperature of  $39^\circ \text{C}$ . ( $102.2^\circ \text{F}$ .), while to a third portion  $\text{CaCl}_2$  is added to induce

clotting. In the second portion there was no loss of sugar; in the third there was a loss, as a rule, in one case this being as much as 25 per cent.; and since this was one of the specimens of blood which showed no loss of sugar on mere standing, the reaction being alkaline, Schenck is inclined to explain this great loss in the clotted blood to the mechanical union of the sugar with the precipitate. This explanation would also account for the great error attached to the method used by Lépine and Barral, who precipitated the proteids by means of  $\text{Na}_2\text{SO}_4$  in boiling water. According to Röhmman, the error in this case may amount to as much as 24 per cent.

#### CIRCULATION.

*Peripheral Vasomotor Action.*—Gley<sup>410</sup><sub>p.702,794</sub> reports some interesting experiments which seem to show that contraction of the blood-vessels may be produced after the medulla and the entire spinal cord have been destroyed. He calls attention first to the existence of subordinate vasomotor centres in the spinal cord itself. He obtained direct proof of the existence of such centres by the following experiment: In a dog, after the medulla is severed so as to cut off the medullary vasomotor centre, there is, of course, a great fall of blood-pressure; but, if now the entire spinal cord is destroyed by washing it out with warm water, a still farther fall results,—a fall in one recorded case from sixty-six millimetres to forty millimetres. Making use of dogs in which the medulla is cut off and the spinal cord destroyed, he finds that the injection of various substances causes a marked rise of arterial pressure. The greatest effect was obtained with anagryne,—the alkaloid obtained from *Anagryris foetida*. Injection of this substance caused, in one case, a rise of pressure from thirty millimetres to two hundred and seventy-five millimetres. At the same time there was a great increase in the rate of heart-beat and also an augmentation in the force of beat. Analysis of the details of this experiment leads him to believe that the rise of pressure was not due solely or mainly to the augmented heart-beat, but to a strong vaso-constriction. Strophanthine produces a similar, though less-marked, effect. He concludes that these substances cause vaso-constriction by action on the peripheral nerve-ganglia rather than upon the muscular tissue of the vessel-walls; although his reasons for this belief are not very convincing.

*Experiments on the Nerves of Lymph-Vessels.*—The close resemblance in histological structure between lymph- and blood-vessels, and the fact that a rich nerve-plexus has been demonstrated in the wall of the thoracic duct of the dog, suggest the possibility of the existence of vasomotor nerves to lymphatic vessels similar in function to those going to the blood-vascular system. As far as physiological evidence is concerned, however, the observation of Paul Bert and Laffont<sup>920</sup><sub>72</sub> stands alone. Camus and Gley<sup>410</sup><sub>p. 464, 74</sub> have succeeded in demonstrating that one part of the lymphatic system at least, namely, the receptaculum chyli, is supplied with extrinsic nerves.

Under the influence of curare all the afferent and efferent vessels of the receptacle (in the dog), with two exceptions, were tied off, the two remaining ones being intended for the introduction of cannulæ. One of these was situated at the posterior end, being one of the net-work of vessels which surround the abdominal aorta and return the lymph from the posterior extremities and the pelvis; the other was the thoracic duct, or one of its branches if this were divided.

All the abdominal viscera were removed except the liver, care being taken not to injure the solar plexus in the operation, and the vascular stalk to the liver ligated. The object of this was to prevent errors arising from movements in these organs during stimulation of the nerves, this and the formation of clots being the main difficulties encountered during the work.

The clotting was delayed by washing out the receptaculum, as soon as the cannulæ were in place, with some indifferent liquid, —at first oil, in the later experiments normal salt solution. Using at first the rheograph, the method consisted in recording the effect on the outflow from the upper cannula when oil was introduced into the lower one under a constant pressure, produced by stimulation of the splanchnic nerve.

The method which was eventually hit upon as being most convenient and most satisfactory was to wash out with normal saline, clamp off the lower cannula, and then connect the upper cannula directly with a water-manometer also containing normal saline. With this arrangement any contraction of the receptaculum would manifest itself by a rise of pressure in the manometer, and dilatation by a fall.

Up to the present time the authors publish only the results obtained on stimulation of the peripheral end of the divided splanchnic nerve. The tracings show that each stimulation is followed by a dilatation which generally passes off soon after removal of the stimulus, but with varying degrees of rapidity. As this dilatation occurs a little before any change in blood-pressure, which, by the way, is recorded simultaneously, and as the blood-pressure either remains unchanged or else rises, indicating vasoconstriction, the movement of the water-manometer cannot be attributed to an indirect effect of the modifications of the blood-vessels. The splanchnic seems, therefore, undoubtedly to contain vaso-dilator fibres to the receptaculum chyli.

*Conduction of the Motor Stimulus in the Heart.*—The object of a paper on this subject by Engelmann<sup>246</sup><sub>B.56,p.149</sub> is to determine the means by which the motor impulse is conducted from one chamber of the heart to another. The author gives a short review of experiments previously made upon the subject, showing that the tendency of modern work has been to discredit the older view of a conduction through nerve-fibres and cells. As to his own experiments, he finds that, in a heart which has ceased beating, stimulation of the auricle may set the ventricle into contraction without causing a visible contraction of the auricle, thus apparently demonstrating the possibility of the conduction of a motor impulse through non-contracting heart-tissue. He made a number of measurements of the time-interval between auricular and ventricular contraction ( $A_s, V_s$ ) and of the same interval when the auricle was stimulated artificially ( ${}_gAV_s$ ) under various conditions, such as changes in the blood-stream, in the number and strength of the stimuli, tension, etc. The detailed results of these measurements are given in the form of tables, but it is stated, in general, that the shortest interval ( $A_s, V_s$ ) for the frog's heart was 0.045", and, even when the heart was removed and was nearly bloodless and scarcely contractile at all, the interval was increased only to 0.072" or, in an extreme case, to 0.128". An attempt was next made to measure the time between stimulation of the auricle at different distances from the ventricle and the resulting ventricular systole ( ${}_gAV_s$ ), in order to obtain data as to the rapidity of conduction of the motor impulse in the heart. When the determinations were made upon the extirpated and nearly bloodless heart, the



difference in time was easily measured within certain limits of error. The result which he obtains is that the velocity of the stimulus through the auricle is about ninety millimetres per second, which is about three hundred times slower than the velocity of a nerve-impulse. This interesting result seems to show that, under the conditions of the experiment, the motor impulse from auricle to ventricle travels through the muscular tissue, and not through nerve-fibres. Moreover, it was shown in the experiments that, when the auricle was stimulated normally from the beating sinus, the form of the curve was similar to that obtained when the auricle was stimulated artificially at the greatest distance from the ventricle, indicating that the normal stimulus to the ventricle arises not near to it, but at the sinus-junction. Lastly, when the auricle is not beating it will, when stimulated, conduct an impulse to the ventricle, although it does not itself contract, and the time-interval ( ${}_gAV_s$ ), under these conditions, is the same as in  $A_s$ ,  $V_s$ , when the auricle is contracting normally. These facts, taken together, support Gaskell's view, that in the normal contraction of the heart the sequence of beat is not mediated through nerve-fibres and cells.

*Tetanus of the Heart.*—Rouget <sup>410</sup><sub>p.397,'94</sub> finds that stimulation of the vagus nerve of terrapins in the middle or upper cervical region by means of the induction current causes the heart to stand still in systole,—a condition which he calls tetanus of the heart. A similar result was obtained on rabbits under certain conditions; after small doses of curare not sufficient to stop respiration, simultaneous stimulation of both vagi only altered the beat in such a way as to produce a decided plateau on the summit of the contraction-wave. But, when the dose was large, a tetanus similar to that obtained on terrapins followed stimulation of both pneumogastrics, which, after removal of the stimulus, was not immediately succeeded by a normal rhythm, but by a series of prolonged contractions with the plateau-form of curve. In these two animals, therefore, the tetanus resembles a greatly-prolonged systole, or tonic contraction. The frog's heart, on the contrary, furnished a series of tracings which seem to support Marey's view as to the nature of heart-tetanus, according to which it is due to the fusion of separate contractions, as in the case of voluntary muscle. The experiments on frogs were also made on curarized

animals, and the stimulus was applied either to one vagus and the ventricle or to both vagi simultaneously. By varying the strength of the current and applying it in these two ways it was possible to obtain all gradations between simple acceleration of the beat and complete, or nearly complete, tonic tetanus, the intermediate stages being represented by incomplete or clonic tetanus, in which the tracings show small undulations for a part or the whole of the period in which the heart remains in systole. Theoretical considerations based upon the comparison of these facts with similar or analogous phenomena observed in voluntary muscle are added to remove the apparent contradiction existing.

*Relation of Cardiac Contraction to the Concentration of the Sea-Water in Some Marine Animals.*—Experiments were undertaken by Schively<sup>246</sup><sub>v.55,p.307</sub> with the view of determining whether increase and decrease of the water-content in heart-tissue had the same effect as that produced in animal tissues by similar changes, as described by Loeb. According to the latter, an increase of water in the tissue acts like rise of temperature and a decrease like fall of temperature. The hearts examined from this stand-point were those of ascidians, crabs, and embryonic and adult fishes, being either entirely removed from the body (ascidians) or merely exposed to view with all their connections intact. Water was abstracted by the addition of varying amounts of NaCl and introduced by the addition of fresh water to the sea-water containing the isolated heart or the entire animal. The results show a striking uniformity throughout, as, within certain limits, in every case addition of NaCl is followed by slowing and addition of fresh water by acceleration of the beat, proper precautions being taken to keep the temperature constant. The extent of the change in the rate of the heart is, moreover, proportional to the amount of the variation in concentration of the liquid. Thus, in molgula, 0.2 gramme (3 grains) NaCl added to 100 cubic centimetres (3½ fluid-ounces) of water containing 3.4 per cent. of salt, in which the heart was bathed, was just sufficient to produce a noticeable effect; 1 per cent. NaCl, or an increase of contraction of about 30 per cent., lowered the rate of the heart 25 per cent. Experiments have also been started on other organs manifesting rhythmical activity, and the results so far indicate that they stand in a similar relation to the concentration of the medium. The bell of

dabylometra—at least, according to the tables given in the paper—gives identical results.

#### RESPIRATION.

*Determination of the Capacity of the Bronchial System and the Alveolar O Tension.*—As the capacity of the bronchial system is the chief factor concerned in keeping the alveolar O tension below that of the inspired air, its importance increasing with the shallowness of the respiration, Loewy<sup>246</sup> attempted in several ways to measure it. By injecting the trachea and bronchial tubes as nearly as possible with plaster of Paris, a capacity of 144 cubic centimetres is found in a given individual,—a figure agreeing closely with the result obtained by Zuntz by a similar method. Owing to the obvious possibilities of error involved in this anatomical method, a modification of Gréhan's method, in which the percentage of CO<sub>2</sub> in successive parts of the expired air after a measured inspiration of atmospheric air was determined, was tried. The result showed, however, that the distribution of the CO<sub>2</sub> in the expired air was largely determined by the character of the expiratory movement and the mode of collecting it; so that the amount of CO<sub>2</sub> may increase from zero in the first portion progressively to the last or may be uniformly distributed. As, moreover, all expirations exceeding 100 cubic centimetres in volume contained considerable quantities of CO<sub>2</sub>, it is evident that this method also gives too small a figure for the capacity of the bronchial system. The author resorted finally to an indirect method of calculating the upper and lower limits between which bronchial capacity must lie from the data furnished by two series of experiments, in the first of which the subject makes shallow respirations under a low barometric pressure so that the minimal physiological alveolar O tension is set up, and in the second of which the deepest possible respirations in air poor in O are used. The first series fixes the upper limit for the capacity of the bronchial system between 140 and 150 cubic centimetres. In the second series it is shown that the alveolar O tension ranges between 42 millimetres Hg and 52 millimetres Hg, when the capacity of the bronchial system is assumed to vary from 160 cubic centimetres down to zero. If the lower limit be taken to lie somewhere between 70 cubic centimetres (which is evidently too low) and 160 cubic centimetres

(which is decidedly above the upper limit), then the alveolar O tension in this second series—where the O absorption was quite sufficient for normal metabolism—varied from 40 to 45 millimetres Hg. It follows, therefore, that the alveolar O tension in the first series—where a minimal amount of O was supplied—could not have been above this level. From this fact the data of the first series enable the author to determine how low the figure for the capacity of the bronchial system may be taken so that the alveolar O tension may not exceed this point, and, as a matter of fact, this is found to be 100 cubic centimetres. The capacity of the bronchial system is, therefore, somewhere between 100 cubic centimetres and 150 cubic centimetres,—140 cubic centimetres probably approximating closely to the exact figure. At the same time these figures fix the lowest normal tension of O in the pulmonary alveoli at 45 millimetres Hg within a limit of error of only a few millimetres of mercury.

*On the Determination of the Residual Air.*—Schenck<sup>246</sup><sub>v. 55, p. 191</sub> takes up this question with the view of finding the cause of the difference between the results recently obtained by Berenstein, who gives, as the ratio between residual air and vital capacity, the figures 1:3.7 to 1:5.8, and the older result of Gad, according to whom the ratio is as 1:2, approximately. The method of experimentation which the author adopts is that of Gad,<sup>2132</sup><sub>81</sub> as he is able to show, by preliminary tests on a rubber balloon, that it gives satisfactory results. It consists in measuring the changes in the volume of the thorax and in the pressure within the air-passages of the subject when a forced inspiration or expiration is made without permitting air to enter or leave the system, starting from the mean position of the thorax. By modifying the method slightly the author finds that the results vary somewhat according to whether inspiration or expiration is used and whether the start is made from the mean position of the thorax or from the position of deepest inspiration or deepest expiration, respectively. A single example will serve to illustrate these differences. The figures obtained for the residual air of the same individual was

- 1660 c. c. when inspiration from the position of deepest expiration was used (A).
- 1900 c. c. when expiration from the position of deepest inspiration was used (B).
- 1720 c. c. when inspiration from the mean position of the thorax was used (C).
- 1400 c. c. when expiration from the mean position of the thorax was used (D).



These variations are satisfactorily explained by Schenck by the simultaneous changes produced in the gases of the alimentary canal by the methods, these changes being different in each of the four modes of procedure indicated in A, B, C, and D.

These gases are affected most in B, less in C, still less in A, and least in D, and in each case their influence is such as to render the result too high, as is shown by actual experiment in which the gases are artificially increased.

Owing to certain possible errors involved in D, which one might expect to give results most closely approximating the truth, the author proceeds to make a series of experiments, using A alone, as coming nearest to the correct result, although the values are admittedly somewhat too high.

It is not only found that the average result is far above that of Berenstein, but even the minimal values in the individual experiments considerably exceed the latter's result. The average result gives, as the ratio of the residual air to the vital capacity, 1 : 2.5; and if—in consideration of the fact that the method gives somewhat too great a result, as pointed out above—the minimal value obtained in any given individual be taken as the nearest approximation to the correct value, this ratio in one case is 1 : 3.1, in another 1 : 3.0. The conclusion seems to be well grounded, therefore, that Berenstein, by the principle of the Davy-Gréhant method, underestimated the residual air when he placed its ratio to the vital capacity at 1 : 3.7 to 1 : 5.8.

*Respiration in Rarefied and Condensed Air and in Air Poor and Rich in O, Respectively*—After a brief description of the nature of experiments on man, made for the most part by the use of the pneumatic cabinet, Loewy <sup>246</sup><sub>B.58,p.409</sub> passes at once to the statement of the following general conclusions: The respiratory gaseous exchanges are independent of the O tension in the inspired air within wide limits, a variation in barometric pressure from 400 millimetres to 1400 millimetres Hg, for example, having no effect upon the amount of O absorption.

Muscular exercise, moreover, has a tendency to increase slightly the O tension within the pulmonary alveoli above the level established during rest in the rarefied air of the cabinet, or else it produces no change at all. The maintenance of the minimal alveolar O tension, which is still adequate with normal metabolism

under such widely varying conditions of atmospheric pressure, is effected chiefly by compensating changes in the extent of the breathing movements. While, for instance, the alveolar O tension stands at 41.2 millimetres Hg when the percentage of O in the inspired air is 12.2 and the depth of inspiration is 292.6 cubic centimetres, it is raised to 43.4, in spite of the reduction of the percentage of O to 7.32, by increasing the depth of inspiration to 972 cubic centimetres.

This compensating change in the mechanics of respiration is, however, only brought into play when the alveolar O tension sinks below the point at which it leads to deficient supply of O to the tissues. Variations above this point have no effect on the breathing movements. A fall of alveolar O tension below 40 or 45 millimetres Hg leads to metabolic disturbances, as shown by the effect on the respiratory quotient, which begins to rise.

The velocity of blood-flow, as shown on dogs by Zuntz's method,<sup>182</sup><sub>B.54</sub> is not influenced by the rarefaction or condensation of the air, unless, by the former, the alveolar O tension is lowered beyond the normal physiological limit.

*Asphyxia in Cold-Blooded Animals.*—A. Marcacci<sup>409</sup><sub>V.21,p.1</sub> finds that the importance of cutaneous respiration in frogs has been greatly overestimated, from the fact that the so-called "vestibular respiration" has not been taken into account. By vestibular respiration is meant the gaseous exchanges occurring in the buccal and pharyngeal cavities in which the air is renewed regularly through the action of the hyoid apparatus. When this is thrown out of function by plugging mouth and nose with cotton the frog quickly dies (within a few hours in warm weather) with marked symptoms of asphyxia; whereas, a frog still possessing the use of this mechanism will live for several days under the same conditions, although both lungs are extirpated. Under water the skin respiration loses even the slight value it may possess in the air; if frogs whose lungs have been collapsed in any way, as by widening the glottis, or have been extirpated, are submerged in water they become asphyxiated. In other words, frogs, like aquatic mammals, must come to the surface to breathe. The loss of sensibility (anæsthesia) observed in these submerged frogs is the result of the accumulation of CO<sub>2</sub> which the skin cannot eliminate, and is not to be attributed to the temperature of the

water, as some have supposed. The conclusion that the lungs are the only efficient means of respiration in the frog is confirmed by experiments on the action of chloroform on frogs with and without lungs, respectively. Chloroform rigor, so characteristic of normal frogs, is never obtained in those dependent on cutaneous respiration alone, the absorption of the chloroform being reduced to little or nothing. The anæsthesia still observed in the latter is of a different nature from that produced in the normal frog, in that it is more transient and is not accompanied by the usual changes in the physiological properties of the voluntary muscles. It is explained as a local effect of the chloroform on the peripheral nerve-endings comparable to the action of cocaine.

Artificial respiration, which the author succeeded in applying to the frog by a simple arrangement, was found to be an efficient means of removing the injurious effects of asphyxia. Its value is shown in those experiments in which frogs were exposed to  $\text{CO}_2$  until its maximal effect was produced, or else were submerged so as to cause an accumulation of this gas in the blood and tissues. Taking the heart as an index, it was found that the slow heart of asphyxia was quickly restored to the normal rhythm by means of artificial respiration. These results have an important bearing on the question as to the action of many drugs in the pharmacological study of which the effect of asphyxia has hitherto been entirely neglected. Curare is said to slow or arrest the heart. Marcacci shows that this action on the heart is only secondary, following upon the cessation of respiration. It does not occur when artificial respiration is maintained. The same is true for muscarine, atropine, and chloroform, and the conclusions drawn as to the action of these substances on the heart are based on experiments in which the effect of asphyxia was superposed upon that of the drug itself. And what is said of the heart in this connection applies equally to other organs, such as muscle and nerve, upon which asphyxia makes itself felt. The paper contains some interesting theoretical speculations in regard to the nature of the action of atropine and muscarine, as well as an indication that the further pursuit of this study may throw light on the general phenomena of anæsthesia and hibernation.

*The Movement and Oxidation of Sugar, Fat, and Proteid as Influenced by the Respiratory Gaseous Exchanges.*—In two pre-

vious publications<sup>391 320</sup><sub>92; 93</sub> Hamburger announced the interesting facts that the blood-gases influence the distribution of the chlorides, proteids, and alkali of the blood. A stream of O gas determines a passage of proteid and alkali from the plasma into the corpuscles and of chlorides from the corpuscles into the plasma, while exactly the reverse movements are produced by CO<sub>2</sub> gas. In a recent paper<sup>320</sup><sub>p.419, 94</sub> he gives an account of further researches, from which it appears that the sugar and fat of the blood are also affected and in a manner similar to that of alkali and proteid. In the presence of O these substances also pass from the plasma into the corpuscles, in excess of CO<sub>2</sub> from the corpuscles into the plasma. The experiments were made on defibrinated horses' blood and consisted in careful quantitative determinations of the sugar and fats, respectively, in equal quantities of the same serum after passing a current of O through it for half an hour, after passing a stream of CO<sub>2</sub> through it for the same time, and in normal serum just as it is taken from the blood. The decrease in the amount of sugar contained in serum after treatment with O in one case was 36 per cent., and that this is not due to glycolysis is shown by the fact that when CO<sub>2</sub> is led through serum after the passage of O through it for one-half hour the usual increase is found. This also demonstrates that the process is reversible and by alternating the two gases the substances named may be made to enter and leave the corpuscles repeatedly. This statement applies equally to the fats, although the extent of the movement in this case is much less. O passed for one-half hour through the serum of blood taken from the jugular vein caused a loss of only 5 per cent. of its fat. The author attempts to show also that normal differences in their contained gases between arterial and venous blood are sufficient to produce an appreciable effect upon the distribution of these substances. Plasma of the blood taken from the external jugular vein contains, according to his analysis, about 4 per cent. more sugar and 2.5 per cent. more fat than the plasma of the carotid blood of the same animal. It is questionable, however, whether any reliance can be placed on these small differences in the face of the difficulties attending the accurate estimation of these substances contained in the blood. In a third section of the paper the advantages to the organism of this regulating mechanism are pointed out. In the pulmonary



capillaries the corpuscles take up O almost to the point of saturation. This induces the entrance of proteid, fat, and sugar into the same corpuscles from the plasma, along with alkali, and thus renders the conditions necessary for oxidation as favorable as possible. Direct experimental evidence is given to show that the proteids and fats are actually diminished by exposing blood to excess of O for a number of hours at body-temperature. Here, again, the differences found are very slight indeed, especially for the fats; but the author thinks it probable that the change thus indicated by his experiments occurs on a larger scale under normal conditions in the body, where the presence of easily-oxidizable substances in the venous blood exerts a favorable influence. Sugar is so much more easily oxidized than proteid and fat that any conditions which suffice for the latter must, *pro tanto*, answer for the former.

A final series of analyses, however, are added, to demonstrate not only that sugar is actually oxidized, but that this process goes on in the whole arterial system, as well as in the pulmonary capillaries. For this purpose the sugar of the blood taken from an artery near the heart (carotid) is compared with that of a distal artery (small artery to the festern of the horse). Although the time required by the blood to cover the distance is but a few seconds, the former is regularly found to contain a little more sugar than the latter (about 0.5 per cent.); and, as the sugar of the plasma of these two bloods is almost exactly the same, it follows that the loss of sugar in the distal artery occurs within the corpuscle.

The author refers to the work of Estor and Saint-Pierre (1865), who also found that oxidation took place in the arterial system; but Pflüger shortly afterward proved their results to be erroneous. It is admitted, of course, that the amount of oxidation occurring here in any case is altogether insignificant as compared with the oxidations going on in the tissues.

The influence of the blood-gases on the permeability of the corpuscles has two additional advantages, according to the author: As the blood reaches the capillaries it gives off nutritive materials to the tissues and the plasma tends to become impoverished; at the same time it receives increasing amounts of CO<sub>2</sub>. The loss of O and increase in CO<sub>2</sub> now discharge proteid, fat, and sugar

from the corpuscles, and so make good the loss which the plasma may have sustained in these constituents. Secondly, by discharging alkali from the corpuscles into the plasma, whence it may pass to the tissues, the oxidative processes in the latter are promoted, chemistry furnishing numerous examples to show that an alkaline reaction is distinctly favorable to oxidation.

#### DIGESTION, ABSORPTION, AND NUTRITION.

*Proteolytic Action of Bromelin.*—Chittenden <sup>178</sup><sub>v.16,p.249</sub> has shown that in the juice of the pine-apple there are contained two enzymes,—one proteolytic and resembling trypsin, to which the name of bromelin is given, and one rennin-like, curdling milk. The proteid-digesting action of the juice is manifested, on some proteids at least, in neutral, acid, and faintly-alkaline solutions. On coagulated egg-albumen the neutralized juice acts most completely, while upon blood-fibrin the greatest effect is obtained with the natural acidity of the juice. The products of digestion contain, among other things, proteoses, peptones, leucin, and tyrosin. The optimum temperature was found to be 60° C. (140° F.), but the limits of active proteolysis extend from 12° C. to 70° C. (53.6° F. to 158° F.). In the present paper, giving the results of work done with several of his students, Chittenden attempts a more detailed investigation of the action of the proteolytic ferment. The natural acidity of the juice equals 0.45 per cent. HCl. Submitted to heat-coagulation, two proteids, apparently distinct, separated out in acid solutions,—one at 75° C. (167° F.) and one at 100° C. (212° F.). The total amount of proteid in the juice was about 0.025 per cent. The ferments, together with the proteids, are precipitated by saturation with  $(\text{NH}_4)_2\text{SO}_4$ , NaCl, and  $\text{MgSO}_4$ , the precipitation being complete with the first salt. The ferments may be obtained free from the neutral salts by dialysis of the solutions of the precipitates. The proteolytic ferment seems to be associated with a proteid which shows, in general, proteose reactions resembling most nearly proto- or hetero- albumose, differing from these substances, however, in being soluble in water without the addition of NaCl. The proteolytic action of the ferment upon egg-albumen and blood-fibrin is described in detail under varying conditions,—such as acid and alkali reactions and presence of neutral alkali salts. The latter were found to have a favoring action in the

digestion of blood-fibrin. The action of bromelin on fibrin needs the presence of an acid, the strength of acidity varying with the acid used. With HCl the optimum acidity is 0.025 to 0.05 per cent., while a strength of 0.1 to 0.2 per cent. practically destroys the digestive action. With the weaker organic acids,—*e.g.*, tartaric,—the maximum effect is obtained with an acidity of 0.15 to 1.0 per cent.

The products of bromelin digestion are numerous, including: (1) an insoluble antalbumid substance; (2) a neutralization precipitate; (3) a peculiar heat-precipitate of an heteroproteose-like body; (4) protoproteose; (5) deuteroproteose; (6) peptone; (7) leucin and tyrosin. The amount of peptone formed is relatively more abundant than in pepsin-hydrochloric-acid digestion. The products of digestion were isolated in as pure a condition as possible and submitted to elementary analysis, the results of which are given in this paper. The deuterio-albumose from egg-albumen and from myosin exhibits a surprisingly low percentage of nitrogen (12.93 per cent., 13.91 per cent.), which the authors explain upon the supposition that the cleavage of the proteid molecule results in the splitting off of a nitrogen moiety. The peptone showed the same peculiarity as regards the percentage of nitrogen.

*The Phosphorus of Casein after Pepsin Digestion.*—Salkowski and Hahn <sup>216</sup><sub>B.59,p.225</sub> find that, contrary to the usual opinion, the phosphorus of casein is not all found after pepsin digestion in the insoluble paranuclein residue. On the contrary, if the pepsin preparation is powerful and the digestion is continued a long time, the greater part of the phosphorus is found in the soluble products of digestion. From these soluble products the phosphorus is thrown down by saturation with ammonium sulphate, which seems to show that it is held in combination with the albumoses. They attempted to determine in what form the phosphorus exists in the soluble digestive products. Their experiments show that it is not present as an orthophosphate or a metaphosphate compound, and is therefore held in combination probably as an organic compound, either in connection directly with the albumose or as a paranucleinic acid. When casein is digested with weak preparations of pepsin or when the digestion is carried on for a short time only, less of the phosphorus is found in the soluble products and more in the insoluble residue; but

the authors argue that the most favorable possible conditions of artificial digestion approximate closest those of natural digestion, and that in the latter, therefore, the phosphorus is probably not split off in an insoluble form.

*Experiments upon the Digestion in a Dog without a Stomach.*

—As the gastric digestion is concerned practically with the proteids of the diet alone, Carvalls and Pachon<sup>410</sup><sub>p.106,'94</sub> determined to what extent this constituent was utilized by a dog whose stomach had been removed as completely as possible. Their method consisted in comparing the N contained in the fæces with that contained in the diet, which is sufficiently accurate for their purpose, although not absolutely quantitative. Extending their observations over an entire month, they gave their dog each day 250 grammes (8 ounces) of meat and 150 grammes (4½ ounces) of dry bread. The meat was cooked on the first nineteen days; the next four days it was raw, but not minced; on the last seven days it was raw and minced. It was found that the boiled meat was practically completely digested and absorbed, but when given raw the digestion was somewhat less perfect,—a result which is not in harmony with that of Ogata,<sup>320</sup><sub>p.91,'83</sub> who also, under less favorable conditions, compared the digestion of raw and boiled meat by the intestine. They found, too, that this dog was able to consume the same amount of putrid flesh without sustaining any evil consequences arising from the absorption of toxic substances,—a fact which indicates that the intestine, when alone present, can protect the organism against this danger. The authors point out, in conclusion, that these results do not warrant the inference, which seems to follow logically, that the chemical functions of the stomach (the peptic and antiseptic) are superfluous and useless to the organism under ordinary conditions. The purely-mechanical functions of the stomach are conceded by every one as useful to the organism. Without his stomach the dog is obliged to spend twelve to fourteen hours over a meal which a normal dog takes easily in a few minutes; otherwise he is exposed to incessant vomiting. In the stomach the muscle-fibres are also dissociated, and so their digestion greatly facilitated. Now, in order to enjoy these mechanical advantages, it is essential that the chemical functions of the stomach be present; without them, the foodstuffs, during their sojourn in this organ, would undergo putrefactive



fermentations and give rise to toxic products which might readily be absorbed and lead to serious consequences. In other words, the presence of a stomach minus its chemical functions is a very different condition from the entire absence of a stomach, in spite of the fact that experiment shows that these chemical functions can be completely replaced by the intestine.

*Absorption and Secretion in the Stomach.*—Brandl<sup>391</sup><sub>v.29,p.277</sub> shut off the stomach from the duodenum by means of the Tappeiner method,—*i e.*, a fistula was made at the pylorus, and through this a balloon was introduced and blown up so as to occlude the opening from pylorus to duodenum. To study absorption, he made use of solutions of peptone, glucose, and sodium iodide. It was found that absorption of these substances did not begin until a certain concentration had been reached. This threshold of absorption was about 5 per cent. for the sugar and peptone and 3 per cent. for the sodium iodide. When alcohol was added to the solutions, in the proportion of 20 volumes per cent., the total absorption might be increased as much as fivefold and the threshold of absorption was correspondingly lowered. Condiments, as mustard and pepper, had a similar marked favorable influence upon absorption. The action of these substances is explained partly as owing to the flushing of the mucous membrane and partly to the stimulating action upon the epithelial cells. The simple bitters, as quassia, on the other hand, did not promote absorption. Mucilaginous solutions—gum arabic, starch, etc.—exercised a marked depressing effect upon the rapidity of absorption. Observations were made, also, upon the amount of secretion in the stomach, the amount of acid, and the total amount of liquid absorbed under the different conditions. It was found that the alcoholic solutions increased the total secretion somewhat. As between the different substances used, peptones caused the greatest secretion, agreeing with the results obtained by Röhmann upon the intestinal secretion. Condiments and bitters seemed to diminish the total secretion. The absorption of water was greatest with the alcoholic and peptone solutions, and a marked increase was observed, also, with the condiments. Comparing his results with those reported by Röhmann upon absorption from the intestine, Brandl points out the striking difference that, in the intestine, absorption is best with quite dilute solutions,—0.5 per cent.;

while in the stomach, with aqueous solutions, absorption does not begin until a much higher concentration,—5 per cent.,—and is not nearly so complete at any concentration as in the intestine. The author interprets this as meaning that the stomach serves as a reservoir from which the chyme is sent by degrees into the intestine in proper dilution for prompt absorption.

*The Formation of Trypsin in the Body.*—Arthus and Huber<sup>410</sup><sub>p.622, '94</sub> have attempted to ascertain whether or not the enzyme, trypsin, is produced elsewhere in the body than in the pancreatic gland. As the most convenient sign of the presence of trypsin they use the formation of tyrosin crystals after prolonged digestion at 40° C. (104° F.). Since tyrosin is also produced by putrefaction of proteid material, it was necessary to conduct all the experiments so as to exclude bacterial action. For this purpose the authors used solutions of fluoride of sodium, which prevents bacterial growth, but does not destroy tryptic fermentation. In making their experiments they used fibrin freshly prepared from horses' blood. The fibrin was macerated for twenty-four hours in a solution of fluoride of sodium, 2 parts to 100. The tissue in which the trypsin was to be sought for was also minced and thoroughly exposed to the action of sodium fluoride. This latter mixture was then added to some of the fibrin previously sterilized, as stated, and the mixture kept, for a variable time, at 40° C. (104° F.), and afterward examined for tyrosin crystals. The following tissues and organs were tested: Pancreas, mucous membrane of stomach and small and large intestines, liver, lungs, heart, striated muscle, brain, thyroid body, adrenals, submaxillary gland, kidneys, spleen, bile, urine, and blood. No trypsin was found in any of these tissues except in the pancreas.

*Absorption from the Small Intestine.*—Heidenhain's experiments<sup>182</sup><sub>B.56,p.579</sub> were made upon dogs which had been starved for forty hours. They were deeply narcotized and a loop of small intestine, about eighty to one hundred and twenty centimetres long and about eight to ten centimetres above the colon, was chosen, ligated at each end, and then opened near each ligature and carefully cleansed with warm saline solution. The loop was afterward filled with the solution whose absorption was to be determined, and was replaced in the abdominal cavity until ready for examination. By careful manipulation it was possible to use the same intestinal

loop for five or six successive experiments. The loop was chosen always from about the same portion of the intestine, as it was found that absorption differs in different parts of the small intestine, being less near the duodenum than in the lower end near the colon. The main object of the experiments was to determine whether or not absorption takes place in accordance with the laws of diffusion. For this purpose it was necessary to have some means of determining the osmotic pressure of the solutions experimented upon and of comparing this with the osmotic pressure of blood. To determine the osmotic pressure he employed, in most of his experiments, the freezing method of Beekmann, which was first applied to physiological work by Dreser. According to this method the osmotic tension of a liquid stands in proportion to the lowering of the freezing-point caused by the substances held in solution. The extent to which the freezing-point is lowered is expressed in degrees and is indicated as  $\Delta$ . For a NaCl solution of 1 per cent.  $\Delta = 0.638^\circ$ , while for serum  $\Delta = 0.622^\circ$ ; the osmotic tension of serum, therefore, is nearly equal to that of a 1-per-cent. solution of NaCl. His first series of experiments was made upon the absorption of serum. Serum from a dog was introduced into a loop of its intestine. If absorption depend upon a difference in osmotic pressure there should have been no absorption in this case, since the osmotic tension of serum is, without doubt, practically identical with that of the plasma, or lymph. On the contrary, the serum was entirely absorbed if left in the intestine sufficiently long,—one to several hours. Experiments made with shorter intervals of time, so that the portion of the serum left unabsorbed could be examined chemically and as to its freezing-point, showed that the salts and water of serum are absorbed in nearly the same proportions, while the organic material is absorbed in far smaller proportions. As the osmotic tension of serum depends almost entirely upon its salts, and as these and the water were absorbed in nearly the same proportions, the osmotic pressure of the serum left in the intestine was nearly identical with what it was when first introduced. A very interesting series of similar experiments were made upon NaCl solutions. For the details of these experiments reference must be made to the original. It is sufficient to say that, for solutions of NaCl, from 0.3 to 0.5 per cent., absorption both of water and salts takes place readily.

Since blood contains over 0.6 per cent. of NaCl, and since its osmotic pressure is higher than that of the dilute solutions of NaCl used, there ought to have been a passage of salt from the blood into the intestine, according to the laws of physical diffusion; the reverse, however, took place. On the other hand, when more concentrated salt solutions were used (below 2 per cent.) both water and salts were absorbed, although the proportions varied with the concentrations. In this case the osmotic pressure of the liquid in the intestine was markedly higher than that of the blood, and, according to the laws of diffusion, there should have been a stream of water from the blood to the intestine; the reverse, however, took place for solutions of NaCl as concentrated as 1.46 per cent., of which  $\Delta = 0.9$ , while for serum  $\Delta = 0.6$ . It seems evident, then, that in absorption of water and salts in the small intestine some other agency than simple diffusion comes into play. Heidenhain believes that the epithelial cells take an active part in the absorption, although the physical or chemical properties of the epithelium upon which this absorptive power depends remain as yet undiscovered. While carefully guarding himself from any vitalistic conceptions, he proposes tentatively to speak of this property of the epithelial cells as "physiological pressure," in contradistinction to osmotic pressure,—the force underlying the processes of diffusion. Osmotic pressure exercises undoubtedly an influence upon liquids in the small intestine, as it does upon liquids in a dialyzer. If, for instance, the concentration of the salt solutions in the loop of intestine were raised to 2 per cent. or over, absorption of water no longer occurred, the great difference in osmotic pressure between the blood and the intestinal contents, which was operating to force water into the intestine, being in this case sufficient to overcome physiological pressure. The amount of absorption in any given case, then, is the resultant of the action of osmotic pressure and physiological pressure. He gives a number of experiments in which, by the action of sodium fluoride, the epithelial cells were affected so that physiological pressure was removed in part or completely, the resulting effect upon absorption being what ought to have followed from an increased action of osmotic pressure. The paper gives very strong evidence, indeed, that absorption even of water and salts from the intestine does not conform to the laws of physical diffusion as worked out for



diffusion through dead membranes. The laws of absorption depend in part upon peculiarities in the properties of the epithelial cells, which must be investigated more carefully.

*Absorption and Secretion in the Small Intestine.*—Voit <sup>391</sup><sub>B.29,p.325</sub> makes use of the method devised by Hermann, of cutting out a small portion of the intestine, leaving its mesentery uninjured, and closing the two ends; he thus gets an isolated closed piece of intestine under normal conditions. The ends of the intestine, after isolating the piece to be experimented on, are, of course, united again by sutures. The animals which survived the operation were killed three weeks later with chloroform. The closed piece contained a thin mass of a yellowish or greenish color and of alkaline, neutral, or feebly acid nature. It did not possess a faecal odor. The dry substance in this mass weighed from 14 to 20 grammes ( $3\frac{1}{2}$  to 5 drachms), and the author gives reasons for believing that it is a secretion, and not derived from the desquamated epithelial cells, as Ehrenthal has claimed. The entire faeces of each animal were carefully collected during the experiment and analyzed, as were also the contents of the isolated piece, for N, Fe, and CaO. By comparison of the amount of the secretion with the total amount of faeces, taking into account the square area of the isolated piece, as compared with the remainder of the intestine, which was computed, he arrives at the conclusion that from 86 to 97 per cent. of the entire faeces is derived from the secretion of the intestinal glands, and that very little, therefore, comes from the liver, pancreas, etc. The nitrogen in the isolated piece was about 6 per cent. of the dry substance and in the faeces practically the same, indicating that the N of the faeces in moderate diet comes entirely from the secretions of the intestine, and not from unabsorbed food. The ash-contents of the separate piece was less than of the faeces. A considerable percentage of fat was also found in the secretion of the isolated loop. With reference to the normal absorption and excretion of Ca, Voit finds that the portion eliminated in the urine is very slight, and, although the amount is increased by adding Ca to the food, the total excretion is always quite small. The proportion eliminated from the intestine is also small. Most of the Ca in the faeces comes directly from the food. Increased Ca in the food leads to an increased elimination from the intestine, but the total amount is

not great. It follows that the absorption of Ca must be slight, even when fed in the form of calcium albuminate.

*Influence of the Nervous System on the Excretory Apparatus of the Bile.*—Doyon <sup>410</sup><sub>p.19,'94</sub> has succeeded in working out the influence of the nervous system upon the gall-bladder and bile-ducts by means of the graphic method, using in his experiments both dogs and cats. This system of efferent vessels from the liver, which is provided with a sphincter muscle at its junction with the intestine, as Oddi has shown, <sup>409</sup><sub>v.8,10</sub> is innervated from the solar plexus and receives, therefore, in this indirect manner, fibres from both splanchnics and vagi. It was necessary to determine, therefore, the effects of stimulation of the central as well as of the peripheral ends of all these nerves; and, in addition, the author examined the effect of stimulation of the mucous membranes of the stomach and intestine. The results obtained may be summed up briefly as follows: 1. The splanchnic nerves supply motor fibres to all parts of the system,—gall-bladder, bile-ducts, and sphincter. The latter may, on stimulation of the splanchnic, contract so completely as to prevent any discharge of bile into the intestine. 2. Relaxation can, in general, only be brought on reflexly. Stimulation of the central end of the divided splanchnic leads especially to a dilation of the gall-bladder. 3. Stimulation of the central end of the vagus has a double effect,—the gall-bladder is made to contract, while the duodenal sphincter is relaxed. Other factors, such as the contractions of the diaphragm, stomach, and duodenum, and vomiting and defecation, which have been supposed to influence the discharge of the bile, play only a very secondary rôle in the process; the more so as, in those experiments in which their effect was determined, the integrity of the sphincter was not preserved.

*Secretory Nerves Regulating Sugar-Formation in the Liver.*—Although Cl. Bernard's *piqûre diabétique* establishes once for all an influence of the nervous system over the formation of sugar in the liver, it gives no means of determining in what manner this is brought about. The increase of the sugar is accompanied in this case by vascular dilatation and increased flow of blood through the liver, and these two phenomena are generally supposed to stand in a causal relation. Morat and Dufourt <sup>410</sup><sub>p.371,'94</sub> attempt to show that the influence of the nervous system is a

direct one, the activity of the liver-cells being regulated by true secretory nerves, by modifying the blood-flow through the liver in other ways and finding that the formation of sugar stands in no direct relation with the blood-supply. Two distinct methods were used by the authors. In the first of these they determined the sugar-content of the arterial blood of the animal at intervals before, during, and after stimulation of the splanchnic nerves. Using curarized dogs for the experiments, the nerves were divided on both sides and stimulated alternately with the induced current for periods of five minutes; or else, the nerves being left intact, the artificial respiration was interrupted and stimulation of the nerves produced at the centre by the venosity of the blood. Either method of stimulation leads to marked contraction of the vessels in the abdominal viscera, and the blood-supply to the liver is diminished.

On the vasomotor theory, this should lead to a diminution in the sugar of the blood. According to the present research this is actually increased, and the authors conclude that the splanchnics contain true secretory nerves for the liver. In this way the asphyxial diabetes, studied by Dastre, receives a rational explanation; in fact, one case is cited in which the usual increase in the sugar of the blood during asphyxia fails to appear after previous section of the splanchnics.

Their second method consists in comparing the activity of two lobes of the same liver with respect to the point at issue, after completely cutting off the blood-supply by ligature of the thoracic aorta and portal vein. One lobe of the liver was completely severed from the rest of the organ, but left *in situ*, and the abdominal cavity closed. The splanchnic nerves being intact, the respiration was interrupted for considerable intervals, and in this way stimulation of the splanchnics made; the impulses reached all parts of the liver except the isolated lobe. After a sufficient interval careful glycogen determinations were made, and it was found that the isolated lobe contained considerably more glycogen than the rest of the liver. As all the conditions were the same except for the nervous connections, this experiment confirms the previous result in showing that the conversion of glycogen into sugar is under the direct control of the secretory fibres contained in the splanchnic nerves.

*Nutritive Value of Gelatin as a Substitute for Proteid.—*

Munk <sup>246</sup><sub>v.56,p.309,94</sub> makes a series of short contributions to special points and general theories in nutrition: It has been shown by Voit and others that, while gelatin cannot replace entirely the proteid of food, it can be substituted for a large part of the proteid without a loss of nitrogen from the animal's body. As is well known, gelatin can replace a much larger part of the proteid of food than isodynamic quantities of fat or carbohydrate. Munk's communication is an effort to determine, more exactly than has hitherto been done, the limit to which proteid food can be replaced by gelatin. The idea of the experiments was to bring a dog into N equilibrium upon a mixed diet and then to substitute a known part of the proteid nitrogen by an equal amount of gelatin nitrogen and to determine the effect upon the nitrogen elimination; that is, the proteid metabolism in the body. His dog weighed 16.5 kilos ( $36\frac{1}{2}$  pounds) and was brought into equilibrium upon a diet of flesh, meal, rice, and lard. The total nitrogen of this diet amounted to 9.73 grammes (146 grains) daily, which is equal to 61.3 grammes (2 ounces) of proteid; so that the animal was using 3.7 grammes ( $56\frac{1}{2}$  grains) of proteid per kilo ( $2\frac{1}{5}$  pounds) of body-weight. During this period the animal gave off 9.37 grammes (140 grains) of nitrogen in its urine and fæces, leaving an excess of 0.36 gramme (6 grains) of  $N=2.3$  grammes (35 grains) of proteid or 11 grammes (165 grains) of flesh, which must have been stored in the body. Following this period was a second period of four days, in which the flesh-meal diet was reduced to 8.2 grammes (123 grains), or 1 gramme ( $15\frac{1}{2}$  grains) of nitrogen per day, and the balance of 8.16 grammes ( $122\frac{1}{2}$  grains) of nitrogen of the first period was substituted by gelatin containing that much nitrogen. The non-nitrogenous diet remained exactly the same as in the first period. In this second period, then, about five-sixths of the nitrogen of the daily diet was given in the form of gelatin. During the first two days of this diet the animal took his food fairly well, but on the third, and especially on the fourth day, showed such a want of inclination to eat the gelatin food that the experiment was necessarily brought to an end. However, during those four days the average daily excretion of N was 9.43 grammes (142 grains). So that even the small amount of proteid in the diet of this period had sufficed to preserve the body from proteid loss. Calculations



based upon his results show that this dog, weighing 16.5 kilos ( $36\frac{1}{2}$  pounds), could be kept from proteid loss for a short period upon a mixed diet of carbohydrate, fat, and gelatin by the use of 0.5 gramme ( $7\frac{3}{4}$  grains) of proteid per kilo ( $2\frac{1}{2}$  pounds) of animal per day. If the gelatin were omitted and the fats and carbohydrates increased to four or five times the quantity used in the gelatin experiments, it was necessary to give at least 1.8 to 2 grammes (28 to 30 grains) of proteid per kilo ( $2\frac{1}{2}$  pounds) of animal daily to preserve nitrogen equilibrium, which shows, in a striking way, that gelatin possesses a much greater power of protecting the proteid consumption of the body than either fats or carbohydrates.

*Influence of the Supply of Proteid Food on the Proteid Metabolisms of the Animal Cell.*—According to Voit, two kinds of proteids are found in the body,—one, the circulating proteid, occurring in the intermediate lymph-stream surrounding the tissue-elements; the other, tissue-proteid, constituting the proteid material of organized structure. As is well known, Voit believes that the rapid oxidation of proteid in the body affects only the circulating proteid, the store of which is being continually replenished from the digested food. Pflüger, on the other hand, has asserted that such a thing as circulating proteid does not exist; that all the oxidation of proteid takes place within the cells. Schön-dorff<sup>246</sup><sub>V.64,p.420</sub> attempts to decide between these views by experiments of three kinds, as follow: Dogs were starved for a number of days, usually eight, and the “hunger-blood” was irrigated a number of times,—(a) through the hind-leg and liver of a starved dog; (b) through the hind-leg and liver of a well-nourished dog. The blood from a well-nourished dog was irrigated repeatedly through the hind-leg and liver of a starved dog. The object of passing the blood through the liver as well as the hind-legs of the animal was to get the products of metabolism in the tissues converted to urea, Schröder’s well-known experiments having demonstrated that urea is formed in the liver. Analyses of the blood were made, before and after irrigation, by the Pflüger-Bleibtren method. The results of the experiments are given in detail and conveniently summarized, at the end of the paper, in a general table. The table shows: 1. Irrigation of the “hunger-blood” through the organs and liver of a well-nourished animal is followed by a rise in the amount of urea in the blood (9.5 to 127.25 per cent.). 2.

Irrigation of the "hunger-blood" through the organs and liver of a starving animal causes no change in the percentage of urea. 3. Irrigation of blood of a well-nourished animal through the organs and liver of a starving animal causes a diminution in the percentage of urea in the blood (13.5 to 14.4 per cent.). The author concludes that the percentage of urea in the blood depends upon the nutritive condition of the animal's tissues. In starvation it sinks to a minimum of 0.0348 per cent., and under good nourishment rises to 0.1529 per cent. The fact that the amount of urea increased with the nutritive conditions of the tissues, but was seemingly independent of the condition of the blood, is offered as evidence that the proteid metabolisms take place in the tissue-elements, and not in the intermediate lymph-stream. The author's experiments corroborate the results of Schröder in proving that the nitrogenous waste-products of metabolism are converted to urea in the liver. He believes that the immediate products of the metabolism are ammonia salts, which undergo conversion to urea in passing through the liver.

*Laws of Proteid Metabolism.*—Pflüger's paper <sup>246</sup><sub>B.64, p. 333</sub> is, for the most part, a polemic directed against the theory of circulating proteids, as stated by Voit. He calls attention to the statement made by Voit, and generally accepted upon the experimental work done by Forster and by Tschiriew, that an increase of blood brought about by an injection of blood into the vessels directly is not accompanied by an increased proteid metabolism, as happens when the same amount of blood is digested. He thinks that the statement is incorrect and rests upon the error that the proteid contents of the red blood-corpuscles were estimated, in the case of the injection, as part of the amount of proteid added to the available store of the animal's blood; whereas, it is only the dissolved proteid in the plasma which can be estimated in this way. By recasting Forster's figures from this stand-point, he finds that the animal's urine showed an increase in urea corresponding to the amount of proteid injected. According to Pflüger, then, the proteid metabolisms of the body will be increased by an increase in the plasma proteids of the blood, whether the new addition is made by direct injection or through digestion and absorption. From the experiments of Schöndorff (see above) he thinks that it is demonstrated that the cells and not the lymph-stream condition

the amount of proteid metabolized. His theory of the means used by the body to metabolize the proteids of the food is expressed as follows: As soon as new proteid is introduced into the liquids of the body it is imbibed by the living cells and absorbed into their structure, and this takes place so quickly that no actual change in the contents of the lymph can happen. The cells, saturated more or less with proteid, begin to metabolize or oxidize the proteid rapidly. There is, therefore, no circulating proteid, in Voit's sense, in the liquids outside of the cells; the oxidation takes place within the cells. Pflüger does not state distinctly, however, whether the excess of proteid taken into the cells and oxidized is first organized into living proteid or not. If not, it would seem to the reviewer that he substantially admits Voit's distinction of a circulating proteid as one easily and quickly destroyed without becoming a part of the tissue, the only difference being that, according to Voit, this takes place outside of the cell; according to Pflüger, inside of the cell. If, however, it is supposed that the proteid before undergoing oxidation must take on a different structure,—the structure of living proteid,—then the idea of circulating proteids would be excluded.

The great power of the animal cell to oxidize the excess of nitrogenous material brought to it after each digestion, Pflüger contends, is not a mere *luxus*. Not only is the heat utilized by the body, but the power of muscular tissue—*e.g.*, to do work—seems to depend upon the intensity of this proteid metabolism, as is shown by the atrophy of the inactive muscle. So that the power of the cell to rapidly metabolize excess of proteid is an arrangement of value in maintaining it in proper condition for the best functional activity.

*Extirpation of the Pancreas.*—Sandmeyer<sup>391</sup><sub>B.29,p.66</sub> reports a new series of experiments upon the result of the extirpation of the pancreas in dogs. He gives a careful description of the technique of the operation. Healing after the operation is rarely by first intention. He made twenty-nine total extirpations. With the exception of two animals, which lived only one and one-half and two and one-half days, all showed marked and continuous glycosuria, the sugar in the urine appearing in from eight to sixty-eight hours after the operation. The amount of sugar rose usually for three or four days to a maximum, remained at this for some

time with slight variations, and then sank slowly or quickly. The animals lived only a few days, fifteen days being the maximum. In opposition to the results of von Mering and Minkowski the author was not able to find in the urine either acetone or oxybutyric acid. Glycogen disappeared from the liver and muscles. The author calls especial attention to the fact that, in addition to the glycosuria, there was a marked fatty degeneration in the liver, kidneys, and the skeletal muscles. This accompaniment of the operation was evident usually at the third day and had reached its maximum at the fifth day. When a portion of the pancreas was left in the abdominal cavity no glycosuria could be detected.

Histological examination of a large number of organs taken from a young dog six days after complete removal of the pancreas was made by the Cavazzani brothers.<sup>409</sup>  
v.21,p.40 The dog became diabetic four hours after the operation and grave general symptoms set in on the sixth day. The most marked structural changes were met with in the nerve-cells of the cœliac plexus and in the liver. The former were shrunken and contained vacuoles in their protoplasm; they had a strong affinity for staining reagents. The liver contained numerous irregular areas which had undergone complete fatty degeneration, contrasting strongly with other areas of a granular appearance which were very hyperæmic. The authors find, in these histological changes, confirmatory evidence for the theory that diabetes from pancreas extirpation is due to lesions of the nerves which are distributed to the liver and regulate its glycogenic function.

#### NERVOUS SYSTEM.

*Chemical Stimulation of Sensory Nerves.*—Grützner<sup>246</sup>  
B.58,p.69 calls attention to the fact that, in comparing chemical substances with reference to their stimulating action on nerve-fibres, it is necessary to use solutions containing the same number of molecules instead of solutions containing the same weights of the salts. While chemical stimulation of motor nerves has been successfully accomplished, the same substances applied to sensory nerves give usually a negative result or, at best, tend to inhibit reflex responses. For instance, NaCl stimulates motor nerves, but, when placed upon the central cut end of the vagus, it gives no reflex effect upon the respiratory movements, although electrical stimu-



lation in this case is effective, even with very weak currents. The negative results of chemical stimulation of the sensory nerves has been explained by supposing that this form of stimulus acts mainly on inhibitory fibres and thus prevents a visible reaction, or, secondly, upon the supposition that probably the irregular character of the stimulation of the different fibres prevents a summation of effect in the central nervous system upon which isolated stimuli are less effective than on muscle-fibres. To test the action of various chemical substances upon sensory fibres the author chose the pain-fibres for study. His experiments were made upon himself. A small cut was made upon the back of a finger, and this cut was then moistened with different substances by means of a small brush. Each substance, after its effect was determined, was removed by washing the surface with normal saline solution. The results obtained are as follow: With regard to the halogen salts, those with larger molecules are the most effective stimuli; thus, iodide of sodium is a stronger stimulus than the bromide, while the chloride is the weakest of the three. A most striking result was the strong stimulating action of potassium salts as compared with sodium salts. Potassium chloride, for instance, produces violent pain in concentrations which in the case of sodium chloride have practically no effect. Of the alkalies, potassium hydrate is a stronger stimulus than sodium hydrate, while ammonium hydrate is the strongest of all, although it will be remembered that this last substance has no effect upon motor-nerve fibres. The other ammonium salts are also effective stimuli to sensory fibres. He tested a number of acids and finds that their effectiveness as sensory stimuli varies in about the same order as their acidity,—that is, their avidity for combination with bases. Nitric, hydrochloric, and sulphuric are the strongest, following in the order named, while phosphoric acid is the weakest. The monatomic alcohols increase in stimulating action, the greater the number of carbon atoms. Glycerin, which is so effective as a stimulus to the motor fibres, is practically without action on the sensory (pain) fibres. These results, particularly the action of the potassium salts, were confirmed by experiments upon frogs, in which the peripheral and central ends of the cut sciatic were tested and upon the vagus nerve of dogs.

*Action of Toxic Substances on the Excitability of Peripheral*

*Nerves and Muscles.*—Having shown that an induction shock of given strength produces a contraction of the same height in the gastrocnemius muscle of the frog, whether applied to the sciatic nerve (motor nerve), A, to the gastrocnemius muscle directly, B, or to the skin of the foot (sensory nerve), C, Grigorescu<sup>410</sup><sub>p.32,94</sub> uses this fact to compare the influence of a large number of toxic substances, including opium and its six constituents, taken individually,—daturine, atropine, physostigmine, pilocarpine, aconitine, curare, veratrine, cocaine, hydrochloride of strychnine, digitaline, caffeine, theine, potassium bromide, chloral hydrate, and butyl-chloral. These substances, according to the author, fall into two groups. Those belonging to one group affect A, B, and C in the same way; at least, so far as any change in the resulting contraction of the muscle is concerned. After maximal doses of the members of this group the height of the contraction, as in the normal animal, is the same, to whichever of the three points the stimulus is applied. Those included in the second group, on the contrary, produce various modifications by affecting the height of the contractions from A, B, and C unequally. Their action is represented graphically in the following manner:—

Representing the three equal contractions of the normal animal by the curves



the following modifications are obtained by the different members of the second group:—

Type 1. Papaverine, butyl-chloral, . . .	
Type 2. Curare, strychnine, thebaine, . . .	
Type 3. Opium and narceine, . . . . .	
Type 4. Codeine, . . . . .	
Type 5. Daturine, . . . . .	

Certain considerations indicating that all those drugs which produced discordant contractions acted upon peripheral structures, it occurred to the author that they might be combined in such a way as to neutralize one another by selecting those which acted in

opposite directions. For example, the drugs enumerated under Type 1 diminish the contraction where the muscle is stimulated directly (B), while stimulation of the motor (A) and sensory nerves (C) gives a normal contraction; those under Type 2 give a normal B, while A and C are diminished. The question was whether drugs belonging to these two types, when given together, would result in restoring the normal condition in which A, B, and C are equal. So far, this hypothesis has only been tested for one pair of drugs, namely, butyl-chloral and strychnine; in this case the result agreed perfectly with the theory. Thus, in one instance, each of three frogs received 0.005 gramme ( $\frac{1}{12}$  grain) of strychnine; but to one of them was given, at the same time, 0.015 gramme ( $\frac{1}{4}$  grain) of butyl-chloral. At the end of ten to fifteen hours the frogs which had strychnine alone were dead, the other still lived. By repeating the dose of butyl-chloral several times in the course of the next two days, the latter made a complete recovery. If the theory should be borne out by further tests of a similar nature, this method promises to produce quite a revolution in the classification of these drugs and in the current views in regard to the physiological action of various alkaloids, especially those of opium.

*Inhibitory Nerve-Fibres and Nerve-Centres.*—In the present state of our knowledge it is not possible to get a clear conception of the mode of action of inhibitory nerves in the same way that the action of motor fibres is understood, and there is a possibility that the inhibitory nerves, as a distinct category of fibres, should be eliminated from our terminology. The experimental evidence thus far adduced in support of this view seems, however, to rest entirely on a confusion in the use of the word inhibition. Compare, for example, the work of Wedensky,<sup>410</sup><sub>p. 50, 92</sub> who shows that the effect produced in a voluntary muscle by tetanizing its motor nerve depends entirely on the strength and rhythm of the induced current. Beginning with a current which is weak and interrupted at a slow rate and gradually increasing both its strength and rate, the resulting contraction also increases with it until the so-called optimum rhythm is reached. Beyond this any additional increase in rhythm leads to diminished contraction, and finally, with a very rapid rhythm and strong current, the muscle becomes completely relaxed. This relaxation is called "inhibition," and is brought about by a change in the character

of the stimulus applied to the same nerve which, under other conditions, throws the muscle into functional activity. That this is not a case of inhibition at all, and that the relaxation observed proves only the inadequacy of the stimulus to act on the nerve, Morat<sup>410</sup><sub>p.7,94</sub> shows by applying a similar series of interrupted currents to the vagus nerve, whose normal effect is to produce arrest of function. It is found that its effect in the direction of stopping the heart follows the same law as that of the motor nerve in producing contraction of the attached muscle.

The experiments, which were made on the terrapin, were modified in various ways; a single series will suffice to illustrate the results. The total time of stimulation remaining the same, a current of given strength produced inhibition of the heart for unequal periods, according to the rate of interruption of the current. With two stimuli per second there was hardly any inhibition, with 4 per second it was greater, with 7 per second the maximal inhibition was observed; so that it became less with 35 per second, and, finally, with 100 per second there was no inhibition at all. If the relaxation of a muscle following rapid tetanization of its nerve is a phenomenon of inhibition, one would have to interpret the above result as meaning that one hundred stimuli per second, thrown into the vagus, *inhibited* the normal inhibition of the heart. The author's explanation is the natural one, namely, that the rapid rate of stimulation was simply inefficient, and the vagus thus stands for a class of fibres which, when stimulated at all, bring about arrest of functional activity in the organ to which they are distributed, independently of the character of the stimulus. It is a true "inhibitory" nerve.

The optimum rhythm of stimulation is, of course, not a definite thing, but is a function of the condition of the nerve at any given time, varying, therefore, in different animals and in the same animal at different times. This is well brought out in those experiments in which the same nerve was stimulated at frequent intervals by strong currents. Although fatigue is relatively absent, the prolonged stimulation has a marked effect on the "optimum" rhythm. Comparing the two rhythms (one hundred per second and four per second) on the fresh nerve and on what may be called the fatigued nerve, it appears that the former gives the longest inhibition with the rapid rhythm, while the latter is



more sensitive to the slow rate. The same fact is also demonstrated on the dog, whose heart is known to escape very quickly from vagus inhibition. If, as soon as this occurs, the rhythm of the current is diminished, inhibition is re-established.

As to the section of Morat's paper devoted to the inhibitory centres, little need be said. It contains no experimental data and merely sets forth the author's view as to the arrangement and connection of the intrinsic ganglionic mechanism of the heart. The chief point which he makes is that the centres from which the impulses producing inhibition arise are properly spoken of as inhibitory centres, and of these the author recognizes one in the medulla and another in the heart itself. The place where the inhibition is brought about he believes to be the so-called motor centre of the heart, and not the heart-muscle itself.

*Influence of the Nervous System on the Excretory Apparatus of the Bile.*—See Doyon,<sup>410</sup><sub>p.19,94</sub> under "Digestion, Absorption, and Nutrition."

*The Sensori-Motor Functions of the Central Convolutions of the Cerebral Cortex.*—Mott<sup>178</sup><sub>v.15,p.464</sub> describes experiments made upon monkeys to determine whether excision of large portions of the motor area was accompanied by disturbances of the sensory functions. The motor areas were not actually removed, but cut so that they remained connected only by the pia mater. In this way very little bleeding resulted and thrombosis and secondary softening were supposed to be prevented. Nevertheless, the result of the operation was that both paralysis and defective sensibility in the opposite side resulted. The well-known experiments of Schaefer and Horsley seemed to show that the gyrus fornicatus was especially concerned in the perception of cutaneous sensations, but Mott is confident that in his operations this gyrus was not at all injured; the lesions were confined entirely to the so-called motor area, nevertheless there was a well-marked defective sensibility in the parts paralyzed, and those parts that remained permanently paralyzed, such as the hand or the foot, never recovered tactile sensibility. A clip fastened on such parts was not noticed, although it was removed quickly when placed elsewhere. Microscopical study showed marked degeneration in the crossed pyramidal tract of the cord and scattered degeneration in the direct as well as the lateral pyramidal

tract of the same side. No degeneration was observed in the posterior longitudinal tract or the fillet; that is, in the sensory tracts. It is important to note that the cuts made by the knife were in the white matter below the cortex, destroying the connection of the gray matter in the motor area, although not directly injuring the cortex itself. He finds above the cuts "evidence of degeneration of the fine fibrillated net-work in the cortex cerebri." This agrees, at least, with the view that there were arborizations of sensory fibres in this region, which had degenerated after section. His experiments lead him to believe, with Munk, that in the motor area "the sensation of touch and of pressure of the corresponding extremities is perceived and reaction to touch and pressure takes place." He agrees, therefore, with those who think that the so-called motor areas are really sensori-motor. Mott states also that he has examined two human cases, operated upon by Horsley, in whom large portions of the motor areas had been removed, and found distinct sensory defects in the regions paralyzed. "Both patients exhibited, some two months after the operation, loss of tactile sensibility in the skin of the paralyzed portions and blunting of painful sensations and of sensations of heat and cold."

*Afferent Tracks in the Spinal Cord.*—Mott<sup>47</sup><sub>p.1,94</sub> records a number of observations, made upon monkeys, in which definite lesions were made in the cord, and the ascending degenerations resulting therefrom were studied microscopically by means of Marchi's stain. In one series of experiments unilateral sections were made of the posterior roots of the lumbo-sacral region of the cord. Degenerated fibres were found only in the posterior columns on the side of the lesion, indicating that none of the entering posterior root-fibres which form the long ascending fibres of the cord pass to the opposite side. Goll's column in the upper part of the cord seems to be formed principally by fibres entering in the fifth, sixth, and seventh post-thoracic roots. New fibres entering the posterior column above the place of lesion occupy the part nearest the gray matter. In a second series of experiments, two only in number, a median section about three-fourths of an inch long was made, involving the third to the fifth lumbar segments. The result of these sections in the cord was a marked degeneration in the antero-lateral columns, especially in the ventral

cerebellar tract (tract of Gower). The symmetrically-placed degenerations in the two antero-lateral columns indicate that some of the entering fibres of the posterior roots, after ending in nerve-cells, pass over to the other side and ascend in the antero-lateral column. Mott's observations did not support Gowers's hypothesis that these fibres mediate sensations of pain, since section of both antero-lateral columns gave him no obvious disturbance of sensation. In a third series of experiments the nuclei of the posterior columns (nuclei of Goll and of Burdach) were cut on one side. The result was a marked degeneration of the internal arciform fibres and of the median and lateral fillet of the opposite side, extending as far forward as the optic thalamus. He got no indication of fillet-fibres passing directly to the cerebral cortex, forming the so-called cortical fillet.

#### SPECIAL SENSES.

*Comparative Physiology of Iris.*—It has long been known that the iris of the eel's eye may be made to contract and expand by exposure to light and dark, even when the eye is removed from the head. There has been a difference of opinion as to the cause of this phenomenon. According to some, it was due to the direct action of the light on the iris; according to others, it was due to the action of the light on the retina giving rise to an intra-ocular reflex in some way. Steinach<sup>246</sup><sub>B. 52, p. 405</sub> has investigated the phenomenon, with care and thoroughness, upon the eyes of frogs, eels, and fishes, and has arrived at definite results which seem to be conclusive. He finds that the effect is certainly due to the direct action of light on the iris itself, since it may be obtained when the posterior portion of the eyeball is cut off and destroyed by heat, or when the iris is completely dissected off from its insertion. In order that this effect may be obtained with certainty, Steinach insists that the animal must first have been kept in the dark for some time, since only under these circumstances is the irritability of the iris sufficiently great to respond promptly to the action of the light. In animals which have been exposed for some time to the light the pupil takes on a medium width and remains so, nearly uninfluenced by the action of light. With reference to the means by which the light causes the sphincter iridis to contract, it is evident that it may lie in the action of the light

on the muscle itself or on the nerve-fibres of the iris. The latter explanation seems to be excluded by the fact that treating the iris with atropine interferes in no way with the action of the light. This operation may also be used to show that atropine probably exerts its action normally in the nerve-fibres, and not in the muscle-fibres directly, as has been suggested by some. Microscopical examination of the musculature of the iris disclosed the interesting fact that the sphincter is composed of spindle-shaped cells of the general appearance of plain muscle-cells, but characterized by the presence of a large number of pigment-granules. The author draws the natural conclusion, therefore, that the action of the light upon the sphincter is explained by the presence of these pigment-granules, which, by absorbing the light, in some way set free a stimulus to the muscle-fibres.

#### REPRODUCTION.

*Comparative Physiology of Male Reproductive Organs.*—Steinach <sup>246</sup><sub>B.56,p.304</sub> gives an account of some exceedingly interesting experiments upon the physiology of the testis and the accessory reproductive glands in the frog and the white rat. The first experiments were made upon the so-called seminal receptacles of *Rana temporaria*. Tarchanoff had stated that the removal of these organs at the mating time destroyed sexual desire on the part of the male. Steinach finds that this is not the case. He examined a number of males in the act of clasping, and found that in the beginning of the act the receptacles contained no spermatozoa, indicating that the inception of the sexual impulse is not to be referred to the mechanical distension of those organs. He then extirpated the receptacles in thirteen males while clasping, with the result that nine returned to the females and continued clasping for five to seven days and four during nine to ten days, thus showing that at no time during the act is the origin of the sexual stimulus to be traced to the condition of the seminal receptacles. In other experiments twelve frogs were castrated in January,—some months before the mating season. When placed with females at the proper season these animals did not attempt to copulate, but if placed upon the backs of the females they clasped feebly for a short time, showing that a certain feeble degree of sexual impulse was still present. The more interesting experiments were made



upon rats. Removal of the vesiculæ seminales, or, as he prefers to call them, the glandulæ vesiculares, had no effect upon sexual desire. Four rats so operated upon, when placed under proper conditions, sought the female eagerly. The author records that, during one hour, one of them copulated eighty times with one female. Steinach points out that, in observations of this kind, attention must be paid to certain points. Above all things the male must be accustomed to his cage; when placed with a female in a strange environment the sexual desire is held in abeyance until the animal becomes accustomed to his environment. An attempt was made next to determine the value of the secretion of these glands in the results of sexual union. The experiments, although few in number, seem to have been made with care. In all, 14 females of known fertility were placed with the 4 males. Of the 14, 9 did not become pregnant at all. The 5 that became pregnant threw 19 young, the litters varying from 1 to 5, the average being  $2\frac{3}{8}$ . He estimates that with normal males about 180 young would have been thrown in the same time. In another series of experiments the seminal receptacles and the prostates were both removed. The removal of the prostates was not complete; a small portion immediately surrounding the urogenital canal was left, as its extirpation might have endangered the canal. The males so operated upon were placed with 12 females of proved fertility during a time corresponding to a total of 42 pregnancy periods. Not a single pregnancy occurred. These experiments throw light upon the physiology of the accessory glands and indicate that in some way their secretions are necessary to the full activity of the spermatozoa, in that they serve as supplies of nutrition or in some way keep them motile for a longer time than would otherwise be possible. The author finds that spermatozoa mixed with prostate secretion retain their motility seven to ten times longer than when mixed with normal saline. The paper concludes with some experiments upon the effect of castration, before and after puberty, upon the sexual impulses. When the castration happened after puberty the animals continued to show strong sexual feeling and covered the female in a perfectly-normal way. After about a year erection seemed to be possible still in some cases; but within a short time the power of sexual union disappeared, although sexual desire was still present, as was indicated by fruitless efforts at

coition. In other experiments the testes were removed from young rats before puberty. At the proper time these animals showed strong sexual feeling. They sprang upon the female and made efforts at copulation, although true erection and ejaculation seem to have been impossible. After about a year indications of sexual appetite disappeared or diminished; the animals, as the author expresses it, gave the appearance of precocious old age. These experiments agree with those upon frogs, and indicate the pre-existence, in some degree, of a sexual sense before puberty, independent of the reproductive gland, although for the full development and maintenance of this sexual sense the normal growth of the testes and accessory glands seems necessary. Observations upon rats castrated after puberty showed an atrophy of the accessory glands, and in the rats operated upon before puberty an arrested development of the same organs.

#### MISCELLANEOUS.

*Coagulation of Proteids Mechanically.*—A number of instances are on record to show that certain proteids may be precipitated from solution by purely-mechanical processes. Among others mentioned by W. Ramsden, <sup>320</sup><sub>p.517,'94</sub> the clearest cases are those of Melseus, <sup>299</sup><sub>v.33,p.140</sub> Kander, <sup>315</sup><sub>v.20,p.416,'86</sub> and Nägeli, <sup>2133</sup><sub>p.506</sub>. These observations seem, however, to have attracted little attention and appear not to have been taken into account at all in the separation and quantitative estimation of proteids. Ramsden not only shows the importance of this peculiar fact by demonstrating its apparent universality, but gives an account of certain observations which seem to throw some light on the nature of coagulation in general. Beginning with egg-albumen, it is first shown that mere shaking of the solution, prolonged for a sufficient time, results in the separation of a coagulum which, for the most part, takes the form of fibres closely resembling fibrin as obtained from whipped blood, although occasionally numerous thin membranes or flakes appear,—and this, no matter what the concentration (so it be above a certain minimum) and whether the reaction be acid, neutral, or alkaline. This precipitate is a true coagulum and agrees in its chemical reactions as closely with fibrin as it does in its microscopical appearance. It is insoluble in water and dilute salines, and swells up without dissolving in KOH 1 to 1000 and HCl

1 to 1000, unless the treatment is prolonged, when it is converted into alkali- and acid- albuminate, respectively. As a solution of crystallized egg-albumen (Hofmeister's method) agitated in beakers lined with paraffin or in leaden vessels gives the same result, it obviously cannot depend on any impurity in the natural proteid or on the presence of calcium or silicates. Satisfactory evidence is also given to show that it cannot be a heat-coagulum. Its behavior to dilute acids and alkalies, in which it resembles fresh fibrin, indicates as much, as well as the fact that the mechanical coagula, when heated to 100° C. (212° F.), undergo a change exactly like that produced in fibrin under similar conditions; they become more opaque, shrink, and offer more resistance to dilute acids and alkalies. But the facts that the heat-coagulation temperature of a proteid, whether high or low, has no influence on the ease with which it is coagulated by shaking, and that proteids like caseinogen and alkali-albumin—which cannot be coagulated at all by boiling—do give mechanical coagula, leave no doubt as to this point. The close similarity of the mechanical coagula to fibrin suggests ferment-action; but this is also excluded by the experiments on alkali-albumin, which still give the coagula on shaking immediately after boiling, if sufficiently cooled. The shaking is just as effective when done in a vacuum or in an atmosphere of H as it is in the air; so that no other possible explanation remains except the mechanical one,—*i.e.*, that by mere shaking or agitation of any sort the soluble proteid is changed to the coagulated form. Without going into details it may be briefly stated that coagula with exactly the same physical and chemical properties were obtained by shaking soluble proteids of various sorts, including egg-globulin, vitellin, serum-albumin, serum-globulin, fibrinogen, muscle-extract, lactalbumin, caseinogen, and alkali-albuminate. It was not possible to coagulate all the albumin contained in a solution, no matter how long the shaking was continued (three to four days). But in each case, after filtering, the filtrate gave a second precipitate; so that by working in this way the author in one case coagulated more than 96 per cent. of the total egg-albumen contained in the original solution.

Fresh blood-serum formed an apparent exception, and the results obtained with it and with alkali-albumin deserve special comment.

While apparently giving a negative result, blood-serum in reality gives in most specimens a slight amount of a semigelatinous coagulum, which was at first overlooked. This becomes much more distinct when the serum is faintly acidulated. Now, serum-albumin and serum-globulin in neutral saline solution, as already stated, act like crystallized egg-albumen. If, however, two slightly alkaline solutions of serum-albumin—(*a*) containing  $(\text{NH}_4)_2\text{SO}_4$  to half-saturation, (*b*) containing the same salt to one-fourth saturation—be examined, it is found that, in both, abundant coagula are formed, but that they disappear in *a* in about fifteen minutes, in *b* so quickly that it is difficult to detect them. Addition of water to *a* hastens the solution of the precipitate in proportion to the amount added. It is supposed by the author that something similar occurs in the fresh serum, and that, while mechanical coagula are formed, the conditions are such that they disappear practically as soon as formed. When these temporary coagula redissolve they return to the condition of the original proteid; in solutions *a* and *b*, above, one gets back the serum-albumin, not alkali-albumin, as might be supposed. The change, therefore, which led to their precipitation could not be of a profound character; in fact, if there were any chemical change in the molecule at all it must have been very slight indeed, as the coagula readily return to their former state. Ramsden therefore speaks of these transitory precipitates as pseudocoagula, to distinguish them from the true coagula obtained from ordinary proteid solutions as described.

He suggests that the shaking has merely disturbed the molecular distribution of the serum-albumin and produced a sort of aggregation of molecules, without any accompanying chemical change; and hence, when these molecular aggregations break up and the coagula redissolve, the original compound is obtained. Whatever the nature of the change brought about by the shaking, in the case of these pseudocoagula, the author argues that it is probably the same for the permanent or true mechanical coagula. It is suggested that in the latter the process merely goes a little farther, and it is possible that these two kinds of coagula represent so many steps in a process of which the firm "heat-coagulum" is the third or final stage (compare the view of Duclaux, <sup>262</sup><sub>V.5,6,7</sub> who also regards heat-coagulation as essentially a physical rather



than as a chemical change). Alkali-albuminate, prepared from mechanical coagula of egg-albumen by digesting the latter in KOH 1 to 1000 for forty-eight hours, resembles serum somewhat, in the fact that the precipitate formed on shaking redissolves at ordinary temperatures in twenty-four hours, but, on boiling, instantaneously. The process may be repeated as often as desired, and here again it is pointed out that no chemical change occurs in the coagulation, although here the evidence is not so striking as in case of serum-albumin, since the solution of the coagulum in this case would naturally lead to the formation of alkali-albuminate.

In conclusion, it may be pointed out that the formation of mechanical coagula is facilitated by the presence of a weak acid reaction and of neutral salts, these two factors here acting in the same direction as they do in the case of heat-coagulation.

*Influence of Several Proteids on Glycogen Solutions.*—According to the early researches of Abeles and of Seegen and Kratschmer, glycogen solutions containing some dissolved egg-albumen, serum-albumin, or casein are partially converted into a reducing sugar, and the conclusion was drawn that a diastatic ferment was produced from the proteid bodies. As Schwiening<sup>246</sup><sub>v. 58, p. 220</sub> obtained uniformly-negative results when similar mixtures were sterilized by the addition of a few drops of chloroform to the solutions, the probability suggested itself strongly that the conversion of glycogen into sugar, under these circumstances, was, in reality, dependent on the action of bacteria. The hydrochloric-phosphotungstic-acid test shows that, even in the presence of chloroform, a small quantity of the above-named proteids, as well as fibrin, goes into solution in distilled water after coagulation. The present research of this author was undertaken with the view of determining which of the above theories is correct, steam sterilization being substituted for chloroform addition, preliminary test having shown that in this case also the four proteids in question are soluble to a slight extent. The method consisted in adding 50 cubic centimetres ( $1\frac{1}{2}$  fluidounces) of a  $\frac{1}{2}$ - to 1-per-cent. solution of glycogen to the coagulated proteids in Erlenmeyer flasks closed with cotton plugs, one set of flasks being sterilized by exposure to steam, a corresponding set left non-sterile. After standing for some time at the room-temperature, both sets were carefully filtered and examined for reducing sugar. To avoid the

possible effect of heat in the sterilized flasks, the method was modified, in the later experiments, so that the glycogen solution did not come in contact with the proteid until after the sterilizing process was completed. The sterilized flasks were all tested by means of gelatin cultures, which in every case remained sterile.

The results are strikingly irregular and lead to no very definite conclusion, although very interesting in themselves. Taking all the experiments made in various ways together, the result may be summarized, briefly, as follows:—

	STERILIZED.		NOT STERILIZED.	
	Reducing Sugar Present.	Reducing Sugar Absent.	Reducing Sugar Present.	Reducing Sugar Absent.
Egg-albumen. . . .	6	6	6	6
Casein . . . . .	11	3	9	0
Fibrin . . . . .	0	10	3	2
Serum-albumin. . .	1	7	1	3

These figures certainly do not bear out the author's earlier view, that the conversion of the glycogen into sugar was connected, in some way, with the action of bacteria. In the case of fibrin and serum-albumin the figures lean most toward this theory; but, even in their case, the lack of uniformity in the result is sufficiently apparent. At the same time, the results do not support the hypothesis of Seegen and Kratschmer; some of the flasks, both sterile and non-sterile, in spite of the presence of proteid, develop no trace of reducing sugar. The proteid substances are, in some obscure manner, connected with the process; glycogen solutions, minus proteid, treated in exactly the same way, do not undergo this change. But what the nature of this influence is, the author concludes, is not possible to state on the basis of the work so far accomplished, the irregularity in the result, even with the same proteid, being as yet entirely inexplicable. One must assume that certain, at present still unknown, factors come into play in the process.

*The Thyroid Gland.*—The symptoms which follow ablation of the thyroid are essentially the same in man and the various animals which have been examined in this respect, although minor differences justify the classification of the cases into acute and

chronic ones. Their gravity in any case leads to the expectation that an examination of the metabolism during the progress of the case would afford evidence of those changes which ultimately result in the complete breakdown of the animal. J. Lorrain Smith<sup>178</sup><sub>v.16,p.378</sub> publishes the beginning of a research on cats dealing with the respiratory metabolism alone, the work on the nitrogenous metabolism being promised for a later publication. According to him, a simultaneous record of the body-temperature, O absorption, and CO<sub>2</sub> elimination, together with accurate observations of the symptoms, lead to strikingly-negative results. The total gaseous exchanges fall only to a very slight extent below the normal,—a fall which is fully accounted for by the loss of appetite and accompanying diminution of food-supply, and the respiratory quotient is unchanged. The most interesting facts of the paper, however, are those which deal with the condition of the heat-regulating mechanism of these animals. In all these cases there has been observed a steady fall of body-temperature. Experiments, in which the behavior of normal animals was compared with that of animals in the condition of cachexia strumipriva when exposed to variations of external temperature, show that there is no disturbance of that part of the mechanism which controls heat-production. On exposure to cold the cachectic cats not only showed a marked increase in the output of CO<sub>2</sub>, but they responded even more promptly than the normal ones. The fall of body-temperature must therefore be referred to excessive heat-loss, which seems to be beyond normal control. The disturbance of the heat-losing mechanism, according to the author, affects both the nervous system, by which vascular control is injured, as well as the skin directly, as indicated by the loss of hair and atrophy of cutaneous tissue. The necessity these animals are under of maintaining body-temperature by means of increased heat-production naturally leads to exhaustion and explains some of the symptoms associated with the death of animals after thyroidectomy.

One other point taken up in the paper is the influence of different foodstuffs. The cachectic animals conduct themselves exactly as normal ones in this respect. With rich proteid diet the respiratory quotient falls, to rise again on increasing the carbohydrates.

Nor is the author able to verify, on cats showing a chronic form of the disease, the aggravating influence on the symptoms of meat-extractives observed by Breisacher on dogs in the acute stage of the affection. Even the flesh of cats dying in the acute stage, when fed to those showing less acute symptoms, gave entirely negative results.

The interesting results of a communication by Fano<sup>409</sup><sub>v.21,p.31</sub> are conveniently arranged under three heads, of which the first deals with the functional connection between the spleen and the thyroid. Zanda's recently-suggested hypothesis is shown to go beyond his own facts, for he finds that, when the spleen is removed one month previous to thyroidectomy, in dogs, the usual consequences of the latter operation fail to make their appearance; and hence the conclusion that the spleen produces a toxic agent which the thyroid normally destroys. The fact that a month is required to elapse between the two operations signifies, according to Fano, that the relation cannot be so direct and simple; it would, at least, be necessary to suppose that the hypothetical product of the spleen must undergo additional slow transformations, either in the blood or in some other organ, before it acquires the toxic properties by which it produces the symptoms of cachexia strumipriva. The author repeated the experiments of Zanda and obtained the contrary result. Eight dogs died after thyroidectomy, although the spleen had been extirpated a month or more previous to the operation. Recovery took place only in two cases,—one a dog which was profoundly anæmic, the other a dog which had been bled, before the operation, for another purpose. The author suggests that the recovery of these two was due directly to their anæmic condition. All metabolisms being retarded in them, the auto-intoxication would be developed more slowly and so furnish an opportunity for other organs to take on, vicariously, the functions of the thyroid. Two other series of observations are pointed out as incompatible with Zanda's theory. The first of these has established the fact that thyroidectomy is much more fatal in young animals than in adults, while splenotomy gives the same negative results in both; the second is that extirpation of the spleen along with the thyroid produces no effect on the changes in temperature, body-weight, and urea elimination, which are brought on by thyroidectomy alone. The author concludes that the only func-



tional bond between spleen and thyroid consists in the power of the former to replace, in part, the loss of the latter, both being blood-glands or, according to Brown-Séquard, glands with an internal secretion.

The second section deals with the question as to whether other glands, possessing an internal secretion, may function vicariously in the same way for the thyroid. Recent discoveries seem to indicate that the property of manufacturing an internal secretion and so acting directly on the composition of the blood is quite general. Take, for examples, the liver, pancreas, and testis. Only one experiment was made with reference to this question, this being done on one of the dogs aforementioned as surviving the double operation of splenotomy and thyroidectomy, the latter having been performed in June, 1889. In October of the same year, both ovaries, a large part of the pancreas, the submaxillary and sublingual glands were removed, and also the left adrenal body. After a severe peritonitis the dog made a good recovery, and finally died after the removal of the last portion of the pancreas, not showing at any time glycosuria or albuminuria, but giving the symptoms of the slow and chronic type of cachexia strumipriva. As far as this experiment goes, it seems to answer the proposed question in the affirmative. The third part contains an account of a crucial experiment undertaken with Magon to disprove the theory advanced by Munk and others, and recently supported by Arthand and Magon, that the effects of thyroidectomy are due to the action of local causes, particularly to a neuritis of the vagi. The experiment need not be described, as it merely confirms evidence of various kinds that has been accumulating against the theory of Munk, and supports the secretory hypothesis.

*The Body-Temperature of Monotremes.*—Richard Semon <sup>246</sup><sub>v. 53, p. 229</sub> gives a brief account of his recent measurements of the body-temperature of 7 individuals belonging to the species *Echidna aculeata*, var. *typica*. According to Miklouho Maclay (1883), these animals, as well as ornithorhynchus, possess a remarkably low body-temperature, and Semon's results confirm this fact. In the 7 specimens obtained by him, of which 5 were adults, the other 2 quite young, the temperature, as measured in the cloaca, varied from 26.5° to 34° C. (79.6° to 93.2° F.), in the abdominal cavity from 29° to

36° C. (84.2° to 96.8° F.). At the same time, the figures indicate a far greater variation in these animals than any found in higher animals,—variations which seem to stand in no direct relation to the temperature of the surrounding air; and, while the body-temperature is low, it is always considerably above the external temperature. The low body-temperature is not the result of hibernation in these animals, as they were taken at the time of the breeding season. Although the data are not yet sufficiently numerous to admit of any broad generalizations, the indications are that the monotremes conform neither to the type of poikilothermous nor to that of the homoiothermous animals, but seem to form a transitional group between these distinct types, just as, in a morphological sense, they constitute a connecting link between reptiles and higher mammals. They may prove of value for the physiological study of heat-regulation in mammals.



# GENERAL INDEX.

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CURATIVE TREATMENT. *Strychn. sulph.* gr. 1-30 to 1-6 (0.002 to 0.01 grm.) hypodermatic. *Cinchona*, *peroxide of hydrogen*, and *phosphate of calisaya* once or twice a day after injection of *strychnine*. *Sodium bromide* or *paraldehyde* to procure sleep. *Erglythorizon cæcid.*, ext. 3i (4 grms.) every hour. Early use *oponorrhia* with *bichloride* and *sp. frumenti* with *wine of antimony*. Regulate diet, ii. F-13, 14.  
ALOPECIA.  
Stick of *chrysarobin* 30, *colophonium* 5, *vera Avena* 35, *olive-oil* 30 parts; used every evening and part cleaned with *olive-oil* in morning. If skin become red and irritable, substitution of *zinc ointment*. Constitutional as well as local treatment; baths 30 to 40 min. of strong *sulphur-water*; foll. by massage for 10 to 20 min. and hot spray for 5 to 10 min. One (4 lires) of *sulphur-water* morning and evening. Locally, *tinct. of iodine* and *hot sulphur-water* sprays, iv. A-10.  
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## THERAPEUSIS.

<i>ANIMAL PARASITES. DRACUNCULUS MEDINENSIS (continued).</i>	
lotion and tightly bandaged. A good purge may be given. <i>Carbolic acid</i> politics, constant traction, and Paget's knife. Compound sulphur talloid (Garrod's formula) every 4 hours daily for at least 10 days, i. E-25. Hypodermatic injection of 10xv to xx (1.0 to 1.3 c.cm.) of a 4% sol. of cocaine into channel occupied by worm, i. E-25, 26.	
<i>FILARIA SANGUINIS HOMINIS. Quinine, i. E-19.</i>	
<i>ANTHRAX.</i>	
Injunct around pustule to 3% sol. carbolic acid 10xvss (1 grm.) 8 times first day and 3 times on second day; cover lesions with sublimate or carbolic dressing. Phenate quinine internally. Excise pustules and cauterize with Paquinin cautery, iii. L-18. Iodophenin, v. A-89.	
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<i>ANTISEPTICS. Sol. of lysol or 3% carbolic acid, iii. N-3. Peroxide of hydrogen 10xvss (1 c.cm.) per kilo-pound (2.15 lbs) of body-weight for cavities; wiping of external parts by tampons wrung out of 2 or 3% sol., iii. N-9. Aliphol, v. A-9. Aluminol, v. A-10. Carbolic acid, v. A-46. Cocaine, v. A-54. Formal, v. A-69. Iodoform, v. A-88. Lysol, v. A-95. Phenocel, v. A-15. Naphthalol sodium, 3% sol., v. A-138. Trikresol, ½% sol., v. A-156. Mercury binitolide for washing cavities; same dissolved in sol. sodium iodide; advantages of same, iii. N-11, 12. Izal emulsions, iii. N-12. Trikresol, iii. N-12, 13. Kresols, iii. N-12. Formalin, Euphorin, 1% sol. Tannin. Sulphur in glycerin emulsion. Acetanilid. Permanganate of potassium and oxalic acid, iii. N-14.</i>	
<i>SURGICAL. Less danger in operation the less the air in room is disturbed. Alcohol flame to sterilize necessary operation-vessels; washing of hands during operation with sterilized 1% sublimate sol. with 5% tartaric acid added, iii. N-1. Region of oper., hands, and instruments prepared by soap and ether. Wound compressed from ¼ to ½ second with tampons of peroxide, exposed to air for minute or two; lips saturated and dressing of absorbent cotton and sterilized gauze applied by bandage, iii. N-9. Use of heat to render wounds aseptic; methods of application, iii. N-10. Boiling instruments in 1% sol. marine salt, iii. N-14. Drainage as rarely as possible; tampons of sterilized gauze to wounds or cavities for 24 or 48 h.; if necessary, secondary sutures. Occlusion of small wounds (if hæmostasis complete) by elastic iodoform collodion, iii. N-2. As little water as possible in operation. Washing out of cysts, cavities, etc., by tampons near composition of blood serum as possible. Recently-boiled water to wash out abdominal cavity. Recently-boiled water, 100° F. (37.5° C.) and normal salt sol. (0.75 per 1000), 3j (30 grms.) avoidupois, in a gallon (4 litres) of boiling water, iii. N-3. Operative rules of Reyburn, iii. N-3. Avoidance of mechanical germicide, except in preparation of hands; mechanical removal of offensive matter. Aseptic sponges without danger, iii. N-4.</i>	
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CHILBLAINS (*continued*).  
(700) and *glycerin*, each  $\frac{1}{2}$  (150 grms.). Apply locally, v. A-62.

FOR RELIEF OF ITCHING, *tinct. of iodine*, lightly painted every 3 or 4 days. Continuous current of feeble intensity, 10 min. application. Fatty substances never to be applied, iv. A-14.

TO IMPROVE CIRCULATION, *digitalis*, gr.  $\frac{1}{4}$  to  $\frac{1}{2}$  (0.50 to 1.50 grms.) of maceration of leaves, two days a week. *Coffeine* and *holé*. Local application of *tinct. digitalis*,  $\frac{1}{2}$  (6 grms.); *crystallized thymol*, gr. xlv (3 grms.); *alcohol* at 70°, *glycerin*, each  $\frac{1}{2}$  (150 grms.). Careful drying of hands and feet, foll. by friction with *eau-de-cologne* or *camphorated alcohol*, iv. A-14.

CHLOROSIS.

GENERAL TREATMENT. Hydropathic treatment to fortify system against changes of temp., i. L-11. *Arsenic* or *arsenic* with *iron*, i. L-13. Dietetic measures with rest and avoidance of exposure to cold, inhalations of oxygen, and organic preparations of iron, as *tartrate*, *citrate*, and *oxalate*, i. L-17.

IF ATONIC DYSPEPSIA PRESENT, simple bitters before meals, as *quassia* or *gentian*; or exciters of smooth muscular fibres, as *strychnia* or *brucia*. At end of meals or half-hour later a wineglassful of *hydrochloric-acid lemonade*, (3 or 4 to 1000). If gastric dilatation, *nophthol*, *saccharate of bismuth*, and *chloroform-water* 3 or 4 hrs. after meal to stop fermentation. Full doses of alkalies if hyperacidity, 1 to 2 hrs. after meal. *Ferratin*. If iron fail, suspend it and give *mercurials* and *saccharates* till uric-acid condition is relieved, i. L-17. *Oxalate iron*, gr. iiss (0.20 gm.), increasing, v. A-89. *Ferratin*, v. A-90. Inhalation of oxygen, v. A-110. *Hydrotherapy*, v. E-4.

CHOLERA, ASIATIC.

GENERAL TREATMENT. Injections of *spermin*, v. A-20. *Sulphate of quinine*, gr. x (0.65 gm.) every hour or gr. xl (2.6 grms.) are taken, v. A-128. Injection of *normal salt sol.* into rectum, v. E-7. Intestines, lavage method and apparatus, i. D-75, 76. Intestinal antiseptics of no avail; transfusion in fulminating cases, i. D-3. *Calomel*, external warmth, and wine. Early diagnosis essential, i. D-4. *Sulphuric* and *phosphoric acids* inimical to growth of germs. Much diluted *sulphuric acid* as disinfectant, i. D-6. Intravenous injections not without danger. Horizontal position or head lowest to keep blood in brain. Treatment by *copper*. Hot baths in algid stage, i. D-21. *Chlorine-water*, half a teaspoonful diluted with equal volume of water every half-hour, i. D-21. Gutte Botkinæ formula: *Tr. chinæ comp.*, anodyne *Hoffmanni*,  $\frac{1}{2}$  15.0; ac. mur. dil., 2.5; ol. menth. pip., 0.3; *chini muriatum*, 2.0. M. Sig.: gtt. xxx 3 or 4 times a day, i. D-21, 22. *Alcohol* inadvisable in alcoholic patients. *Acid lemonade* of *citric* or *tartaric acids*; ice; and, for gastric irrita-

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## THERAPEUTIS.

## CHOLERA, ASIATIC, GENERAL TREAT-

MENT (*continued*).  
 bility, *menthol* or *cocaine*. Teed *coffee*  
 preferable to *champagne* in case of  
 reaction. *Opium* dangerous except in  
 intolerable cramps; best given as *mor-  
 phine* hypodermatically. Hot baths  
 cautiously, if at all, in tendency to de-  
 lirium. *Veratrum album* in frequently  
 repeated doses. Alcoholic stim, and  
 external treat. for cramps, coldness,  
 and cyanosis. Infusions in algid stage,  
 subcutaneous and intra-venous infus.  
 of 1 to 3 litres of 0.6 % sol. of *sodium  
 chloride* at temp. of 400 C. (1049 F.),  
 i. D-22. Hypodermatic injections of  
*camphor* and internally *salol* and  
*salicylate of bismuth* in large doses;  
*cocaine* for vomiting. Juice of raw  
*cranberries* for vomiting and thirst, i.  
 D-23. *Musk* gr. xvss (1 grm.) in di-  
 vided doses every 8 hours. *Volatile  
 oils* as antiseptics. Mitigation of  
 vomiting action (control of vomiting and  
 diarrhea by *cocaine*, *creasote*, etc.).  
 Stimulate heart by *camphor* injections.  
 Disinfect intestinal canal by  
*salol* and *bismuth salicylate* and later  
*relhthol*. Enemata of *tannic acid*;  
*creasote* or *allylsulphide* by mouth;  
 subcut. injection of *Kiebs's antichol-*  
*era*. *Catamel* only in lighter cases, i.  
 D-24. Infusion of salt solution in  
 algid stage, i. D-24. Intra-venous  
 injections and hot baths in algid  
 stage, i. D-24. *Catamel* and *tribrom-*  
*phenol-bismuth*, i. D-24. Intra-  
 venous injections superior to sub-  
 cutaneous; method and instrument,  
 i. D-24. Spanoudis's treatment, i.  
 D-25. Turkish baths, i. D-25.

IN ALGID STAGE, prolonged hot baths  
 useful; hypermucolysis and entero-  
 clysis of no great avail. No single  
 treatment specific, i. D-21. *Salol*.  
*Catamel* in mild cases; enteroclysis  
 and subcutaneous injections to check  
 collapse, i. D-21.

## PROPHYLAXIS. Care of general health

and nutrition of population, i. D-7.  
 Disinfectants; *sosiodol* preparations  
 superior to *tribromphenol-bismuth*;  
*formalin* of only moderate efficiency;  
 boiling water most efficient, rapid,  
 and cheap; soap, 2 % sol. toxic toward  
 germs; *sublimite soap*; 5 days' vital  
 limit in ice; temp. of 100 C. (140 F.)  
 destroys pathogenic properties in half-  
 hour, i. D-8. Drinking-water must  
 be without bacilli and nitrates. Meat  
 the only safe diet, i. D-7. Vitality  
 of germs diminished by exposure to  
 direct sunlight, i. D-8, 9. Drink-  
 ing-water without danger if wine  
 added, 1 to 3, and allowed to stand  
 5 min.; beer found to kill bacilli in 5  
 to 10 min., i. D-9. Dejecta and all  
 articles soiled by them to be brought  
 under water as soon as possible, i.  
 D-12.

## CHOLERA INFANTUM.

Stop food for 24 hours and then change  
 diet; give rice-water. *Nitrate silver*  
 0.05 grm. to 50 grms. of distilled  
 water. *Catamel* or Van Swieten's  
*Liquor (bichloride of mercury)* 6 drops  
 every 4 or 6 hours. *Normal salt sol.*  
 subcutaneously, ii. L-17.

## CHOREA.

*Quinine* in progressive doses. Frank-  
 linization in form of static baths.  
*Antipyrim* with repose. *Nitroglycerin*.

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CHLOROSIS (*continued*).

## TREATMENT.

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 er, Klenperer, Vincenzi, Ketscher, i.  
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GENERAL TREATMENT. *Graham bread*,  
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ous inject., v. A-44. *Podophyllin*,  
gr. ½ to ½ (0.02 to 0.03 grm.), v. A-  
122. Waters of Cordo Spruings in Haz-  
burg, v. E-21. *Laxatives*, not *purga-*  
*tives*, for pain, *bromide* or *chloride* of  
*calcium* or *menthol* in solution. *Phos-*  
*phate of soda* to prevent fermentation  
and tympany. By suggestion. Cold  
baths, massage, gymnastics, faradiza-  
tion, etc. Lavage of intestine with  
large amounts of oil, i. D-46. Drugs  
only to relieve symptoms; cure by  
regulation of habits, dress, diet, and  
exercise. Massage and electricity of  
great value to aid establishment of  
regular habit. Free use of water.  
Proper diet, regular exercise, and  
avoidance of cathartics. Hygienic  
treatment by diet, massage, electricity,  
hydrotherapy, and use of injectious.  
Purgatives only in an emergency, i.  
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IF INTESTINE IS ATONIC exercise, mas-  
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A-15, 16. <i>Hydrarg. precip. alb.</i> and <i>acid. pyrogall.</i> , each 5j (4 grms.); <i>lanolin</i> , 5j (31 grms.). Crusts, etc., healed by <i>hydrarg. oxid. rub.</i> , gr. v (0.32 gm.); <i>sulphur. sublimat.</i> , 5ij (8 grms.); <i>vaselin</i> , 5j (31 grms.). <i>ol. bergamot.</i> , q. s., iv. A-16. In obstinate cases, scarification. If much weeping, <i>forme</i> , gr. iv to viij (0.26 to 0.52 gm.); <i>zinci oxid.</i> , <i>lauri</i> , aa 5vj (23 grms.); <i>vaselin</i> , 5iss (30 grms.), iv. A-16. DIABETES MELLITUS. COMPLICATIONS. ENTERIC FEVER. First week, ordinary full diet; <i>opium</i> by mouth. Next five weeks, a rigid diabetic diet, i. G-20. GANGRENE. If developed without inflammation, absorbing-powders, as <i>salicylate of bismuth</i> and <i>iotaform</i> , i. G-32. Antidiabetic treat. important, even if diabetes not influenced, i. G-33. If sphacelus from carbolic acid, all dressings the least irritating are contra-indicated. 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If produced by toxic or infectious agents, prompt evacuation. In acute forms, neutral salts; in chronic, antiseptic purgatives, as <i>calomel</i> . These should be foll. by <i>bismuth</i> and <i>opium</i> with astringents. If antiseptics used, organs on which they act to be watched. Diet of impor- tance. <i>Morphia</i> best for diarrhœa of typhoid fever, dysentery, and cholera. <i>Guava-leaves</i> in powder or infusion, i. D-28. Stop all food for some hours. Give pure and cool water freely. Heat to the feet, cold to the head, and stimulants to the abdomen. Antiseptic remedies, as <i>calomel</i> , <i>arsenite of</i> <i>copper</i> , <i>sulphocarbonate of zinc</i> , <i>salol</i> , <i>bismuth</i> , and <i>bicarb. soda</i> ; <i>opium</i>	DIABETES MELLITUS (continued). PATHOLOGY, EXPERIMENTAL. Seelig, i. G-19; Lépine, Thiroloix, Bedart, i. G-20; Hedon, Kaufmann, Lépine and Barral, i. G-21; Kauf- mann, Charrin and Carnot, Gley, Alberto and Emilio Cavazzani, i. G-22; Hedon and Truc, i. G-23. 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## THERAPEUSIS.

## DIARRHŒA, GENERAL TREATMENT (continued).

and astringents given cautiously.  
*Morphia*, gr. 1-100 (0.00065 grm.)  
hypodermatically. *Bichloride of*  
*mercury*, gr. 1-100 (0.00065 grm.) in  
colorless sol. of *hydrastis*, ii. I-15.  
Wash out the stomach and irrigate  
bowels, regulate diet, barley-water  
and home-made beef-juice. Give a  
purg. of *calomel* or *castor-oil* and  
*syrup of rhubarb*, equal parts,  
and then give *benzo-naphthol*, gr. ij.  
(0.13 grm.); *bismuth salicylate*, gr.  
ij (0.13 grm.); *Dover's powder*, gr. ss  
(0.03 grm.), ii. I-17. In cases with  
fermentation, *arrow-root*, soda-crack-  
ers and rice, *salut, salicyl., calomel*  
and *bismuth*, ii. I-16.  
IN ADULTS. *carbolic acid*. *Codaine*,  
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PREVENTIVE TREATMENT. Pure air  
and properly-prepared food, sterilized  
or Pasteurized, ii. I-15. *Infus. djam-*  
*boe*, v. A-64.

INFUSORIAL. *Calomel*, i. D-27.

TROPICAL. Exclusive milk diet in  
small quantities, viz., 3iv to vj (124  
to 186 grms.) every hour, day and  
night, i. D-30.

## DIPHTHERIA.

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diac weakness, v. A-44. *Formol*, i. 2  
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*iron pure* locally, v. A-90. *Menthol*,  
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INFLAMMATION, CALCIC, OF PERIDONTAL MEMBRANE. Remove tartar; syringe *peroxide of hydrogen* sol. under gums, and antiseptic mouth-wash and powder for a week. If tissue thick and inflam. active, 20% sol. of *zinc chloride* by syringe under edge of gums, i. C-19.  
If MUCH TISSUE DESTRUCTION, foll. mix. to parts with brush every 4 days: *Oil of cinnamon*, ʒiv (16 grms.); *oil of gaultheria*, ʒiv (16 grms.); *carbolic acid* (crystals), ʒj (4 grms.), i. C-19.  
PERICEMENTITIS, PHAGEDENIC. All eversions, jagged points, and thick edges to be removed, and cavities afterward syringed by 30% sol. of *chloride of zinc*, i. C-19.  
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## THERAPEUSIS.

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ASTHENIA, NERVOUS. Rest in bed, with graduated shower-bath when able to sit up, i. B-35. Massage, better at later stage; then Swedish movements and light exercise. Food nutritious and frequent. Stimulants often needed. <i>Strychnine</i> gr. 1-30 (0.002 grm.) t. d., continuous. <i>Arsenic</i> , <i>digitalis</i> , <i>strophanthus</i> , <i>adonidin</i> and <i>chlorate of barium</i> , <i>caffeine</i> , and <i>cocaine</i> , i. B-35, 36.	
ASYSTOLE.	
CARDIO-VASCULAR. <i>Digitalis</i> . Patient first put to bed. Diet largely of milk for several days. On 2d or 3d day a purgative, as <i>calomel</i> , and <i>resin of scammony</i> or <i>compound tinct. of jalap</i> . Foll. day at one dose, not repeated, grt. xl to l of a l to 1000 sol. of <i>crystallized digitaline</i> , i. B-40. If <i>digitalis</i> fail to act from cardiac obstruction, bleeding; or, if oedema, scarification; or, if obstruction due to congested viscera, <i>calomel</i> and a few wet cups to liver; or, i. B-40, 41. <i>Digitalis</i> should not be used with <i>antipyrin</i> , <i>bellatonna</i> , nor <i>opium</i> ; <i>iodides</i> and <i>nitrates</i> also incompatible with <i>digitalis</i> . As prophylactic measure, grt. xxx to xl of l to 1000 sol. of <i>digitaline</i> for single day, or, alternately every two weeks, one dose of <i>digitaline</i> and 4 to 6 doses of gr. vii½ (0.5 grm.) each of <i>theobromine</i> , in cachets. Powdered <i>digitalis</i> , <i>scammony</i> , <i>squills</i> , of each gr. xvss (1 grm.) to make 20 pills, 4 or 5 daily for 3 or 4 days, i. B-41.	
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LARYNX, DISEASES, LARYNGITIS (*continued*).

CHRONIC. Minute longitudinal incisions, with scarification into hyperplastic tissues of the cords; spraying with a 2% sol. of *lactic acid* eight to ten times daily. Hygienic measures and tonics, iv. D-87.  
HYPERTROPHIC. Laryngo-fissure and thorough extirpation of vegetations, iv. D-87.  
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PRIMARY. Inhalations, insufflations, applications by means of a brush, and cauterization with *lactic acid* or *iodine*. If thickening, remove by cutting-forceps. If small nodules, rest and applications of *silver nit.* If it affect vocal process in typical form, expectant treat.; avoid alcohol, tobacco, and use of voice; inter. administration of *iodide of potass.*; electrolysis, 10 to 12 milliamp., 3 to 5 minutes at a time. Removal by cutting-forceps. Cold or electro-caustic snare, iv. D-117.  
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## THERAPEUSIS.

MOUTH, DISEASES.  
GENERAL TREATMENT. If eruption of wisdom-tooth cause amygdalitis, stomatitis, etc., extraction; or, if tooth not diseased, excision and cauterization of surrounding gum with *chromic acid* and cleansing with antiseptic gargles, i. C-18.  
NOMA. *Methylene-blue*, 20 to 30 % sol., applied hourly, v. A-15.  
STOMATITIS. Care of mouth to prevent putrefactive processes. All local causes of irritation to be removed. Antiseptic applications valuable, i. C-3. Children and very old should rinse mouth several times daily with *luteoarm water* containing a little salt, tr. of myrrh, or *eau-de-cologne* to stimulate secretion. *Powd. boric acid* rubbed between lips and gums if gums have a tendency to bleed or bad teeth present. Small sores powdered with *boric acid* or *chlorate of potash*. Cracks and corners of lips healed quickly by drying and treating with *vaselin* and *boric acid*. Mucous membrane may be stimulated by wiping tongue and mouth and pressing tongue with moist towel, i. C-1. Air in room moist or mouth covered by moistened cloth. Cold water or weak lemonade to drink, i. C-2. Feverish patients from beginning should have lips rubbed several times daily with *vaselin* or *fat*. In protracted fever cases, swabbing out of mouth with *oil*, fat, or largely-diluted *glycerin*, i. C-2. *Peroxide of hydrogen* effective, i. C-2. *Potassium permanganate*, 5 to 10 % sol., v. A-79.  
ULCEROSA. Gargling mouth with sol. of *chlorate* or *permanganate of potassium* before and after meals, and afterward inserting an *iodoform*, *boric*, or *salicylic acid gauze compress* between cheek and gum on diseased side; compress to be removed before eating, a gargle again used before renewed compress is inserted, i. C-4.  
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In- jection of ℥℥xvss (1 c.cm.) of <i>ether</i> in morning, and 2 pills of gr. 76 (0.05 grm.) <i>extract of opium</i> at night. In aggravated cases ℥℥xxj (2 c.cm.) of <i>ether</i> in morning, and pills of gr. 1-6 (0.01 grm.) <i>ext. opium</i> every 2 hrs. during day. During night, gr. iij (0.2 grm.) of <i>Dover's</i> <i>powder</i> in several doses, i. A-37. <i>Quinine sulphate</i> and <i>tannic acid</i> , latter in doses of 5i34 or iss (5 or 6 grms.) daily for acute cases, i. A-35. Treatment by salts of <i>copper</i> : formu- lae for lotions, ointment, collyrium, potion, pills, powder, and hypoderm- matic preparations of same, i. A-36, 37. Thorough inoculation with vac- cine virus. <i>Fld. ext. ergot</i> , 5ss to ij (2 to 4 grms.); or <i>ergotine</i> , gr. ss to iv (0.03 to 0.26 grm.) several times daily. Powdered <i>ergot</i> , gr. v to x (0.32 to 0.65 grm.) at bed-time, to control night-sweats. <i>Ergotine</i> . <i>Ex- tract of ergot</i> , 3 parts; <i>dilute alcohol</i> , <i>glycerin</i> , and <i>distilled water</i> , of each 5 parts; ℥℥xv (1 grm.) of this mix- ture by subcutaneous injection at night. <i>Ergot</i> , <i>ergotine</i> , gr. ij (0.13 grm.) 3 or 4 times daily. <i>Aromatic sulphuric acid</i> in <i>plain</i> or <i>sweetened water</i> , ℥℥x or xv (0.65 or 1 grm.) at bed-time, or 3 doses of ℥℥vii to x (0.45 to 0.65 grm.) each, late in after- noon, early evening, and at bed-time, i. A-38. Filtered crude <i>petroleum</i> (Rumanian) in capsules. Inhalation of air passed thro. <i>petroleum</i> , i. A-39, 40. Establishment of artificial pneumothorax and method of same, i. A-40. Mechanical enlargement of thorax and aërial capacity of lungs, with apparatus for same, i. A-40, 41. 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Tonic nutrient, and for a pro- phylactic in predisposed or those run down in health, <i>tinct. ferri chloridi</i> , f5ij (8 grms.); <i>dil. phosphoric acid</i> , f5ij (12 grms.); <i>Churchill's syrup of hypophosphites</i> , q. s. ad f5ij; two teaspoonfuls after meals, t. d., in water, i. A-32. IN INCIPIENT CASES, injection of <i>blood-serum</i> from immune animals, i. A-30. Rectal administration of <i>crea- sote</i> : each enema, gtt. v of <i>crea- sote</i> in <i>olive-oil</i> , yolk of an egg, and (250 grms.) of warm water; increased to gtt. xl daily, i. A-31. <i>Ammonium</i>	TONSILS, DISEASES ( <i>continued</i> ). HYPERTROPHY. Mandragera, P. R. W. de Santi, iv. D-77; Lennox Browne, A. Barkan, S. G. Dabney, Augustus Caillé, Jacobi, iv. D-78; Koplik, W. Ward, T. A. de Blois, F. P. Hudnut, Edwin J. Kuh, W. K. Simpson, iv. D-79; A. Gerwant, Marcel, George J. Monroe, T. Mark Hovell, R. Pellicier, C. C. Rice, L. S. Givens, J. Madison Taylor, iv. D-80. REMOTE DISORDERS. Buschke, H. L. 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619. Revista médico-farmacéutico de Aragón, Zaragoza.
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831. Revista de higiene y policia sanitaria, Barcelona.
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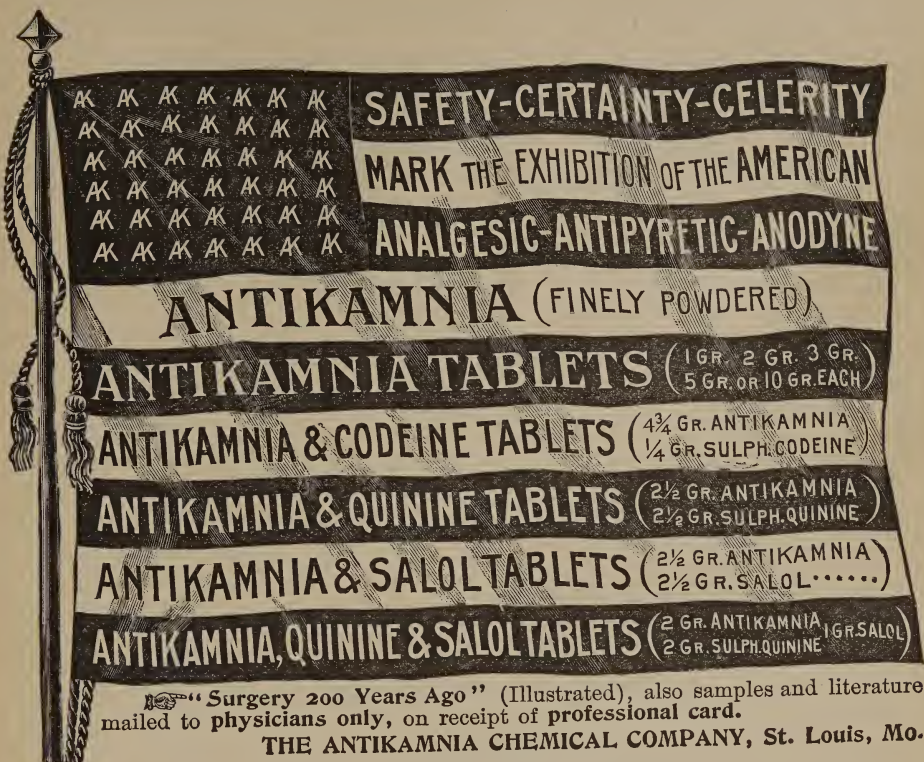
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
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## “A REPORT OF TEN SELECTED CASES OF LAPAROTOMY, WITH REMARKS,”

read in the Section of Obstetrics and Diseases of Women, at the Forty-second Annual Meeting of the American Medical Association, held at Washington, D. C., by Jno. H. McIntyre, A.M., M.D., contains the following:—

“I use little opium or morphia, for the reason that these drugs, by locking up the secretions, limit the power of eliminations, and thereby favor septicæmia. For over a year past, in cases of laparotomy where pain and rise of temperature were present, I have used Antikamnia, in ten-grain doses, with the happiest effects.”—*The Journal of the American Medical Association*.

In the after-treatment of a case where an “OPERATION FOR THE RELIEF OF AN IMPERMEABLE OCCLUSION OF THE ŒSOPHAGUS OF FIVE YEARS’ STANDING” had been performed, which operation was reported at length in the *N. Y. Medical Journal*, Dr. Augustus C. Bernays, A.M., M.D., Heidelberg, M.R.C.S. Eng., Professor of Anatomy and Clinical Surgery at the Marion-Sims College of Medicine, St. Louis, the operating surgeon, says:—

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The January number of *The Quarterly Journal of Inebriety*, Hartford, Conn., says, through its able editor, T. D. Crothers, M.D.:—

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